# Data Quality in the Military Health System:

# A Research of Data Reliability in the Medical Expense and Performance Reporting System (MEPRS)

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In light of significant data driven programs (Enrollment Based Capitation, Medicare Subvention) within the Department of Defense (Health Affairs), data quality management is becoming an important management principle. A key information system these programs rely on is the Medical Expense and Performance Reporting System (MEPRS). This paper studies the dimension of data reliability within the MEPRS system. It compares and analyzes data from the local MEPRS system at each graduate medical education (GME) medical treatment facility (MTF) for all three services, and compares it to the same data sets residing at the replicated databases at each MTF's affiliated central MEPRS system (MEPRS Central or MEQS). Up to now, data reliability is an assumption held by many within DoD. Unfortunately, this has never been comprehensively studied and therefore, never proven. Without reliability verification, the other fundamental data quality principles (accuracy, completeness, and currency) become meaningless. This paper will research MEPRS reliability by comparing the consistency of data between the local and central systems for each GME MTF within DoD at the MTF level (gross summary level), the functional category level (MEPRS 1st Digit), and the work center level (MEPRS 3rd Digit). This study is a necessary fundamental step in the eStablishment of sound data quality improvement programs for the DoD MEPRS system.SA

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ABSTRACT

In light of significant data driven programs (Enrollment Based Capitation, Medicare Subvention) within the Department of Defense (Health Affairs) data quality management is becoming an important management discipline. A key information system these programs rely upon is the Medical Expense and Performance Reporting System (MEPRS). This paper studies the dimension of data reliability within the MEPRS system. It compares and analyzes data from the local MEPRS system at each graduate medical education (GME) medical treatment facilities (MTFs) for all three services, and compares it to the same data sets residing at the replicated databases at each MTF's affiliated central MEPRS system (MEPRS Central or MEPRS Executive Query System). Up to now, data reliability is an assumption held by many within DoD. Unfortunately, this has never been comprehensively studied and therefore, never proven. Without reliability verification, the other fundamental data quality principles (accuracy, completeness and currency) become meaningless. This paper researched MEPRS reliability by comparing the consistency of data between the local and central systems for each GME MTF within DoD at the MTF level (gross summary level), the functional category level (MEPRS 1st Digit), and the work center level (MEPRS 3rd digit). This study was a necessary fundamental step in the establishment of sound data improvement programs for the DoD MEPRS system.

TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

# INTRODUCTION

## Conditions Which Prompted the Study

This paper will research the data integrity of the Medical Expense and Reporting System (MEPRS) in the Military Health System (MHS). This study is important because of the dramatic changes currently occurring in the MHS. Department of Defense (DoD) downsizing efforts, combined with a national imperative to reduce health care costs, are pressuring the MHS to restructure into a more cost effective system. Staffing, services, and budgets are all being analyzed for process improvements. In 1994, DoD published The Economics of Sizing the Military Medical Establishment, more commonly referred to as the 'Section 733 study', that evaluated the economic efficiencies of the pre-existing structure of the MHS (DoD, 1994). The study identified inefficiencies in the MHS and also suggested the size of the organization was larger than needed. In response to this "make or buy" study, the MHS has instituted very aggressive restructuring and downsizing programs. The rationale and basis for current and future changes are based upon the information systems currently supporting the MHS (Corey, 1997).

The MHS has many systems. Five of the most critical systems are: 1. The Medical Expense and Performance Reporting System (MEPRS), 2. Retrospective Case Mix Analysis System (RCMAS), 3. Resource Analysis and Planning System (RAPS), 4. The Defense Eligibility and Enrollment Reporting System (DEERS), and 5. The Composite Health Care System (CHCS). As a whole, the MHS relies on these systems (and their subsets) to provide accurate information as part of the decision making process.

The MEPRS system is a "multi-user information system that supports the reporting and analysis of financial and operating performance data from Department of Defense (DoD) medical

treatment facilities (MTFs)." (OASD(HA), 1995a). Its purpose is to provide utilization, manpower, costing, staffing, and expense information concerning the MHS.

RCMAS is a biometrics database containing patient level information. It is used for "healthcare planning, management, and assessment" (OASD(HA), 1995b). It collects all inpatient direct care (from the Standard Inpatient Data Record (SIDR) and the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS)). It provides admission, treatment, and disposition information for all patients treated within the MHS MTF facilities.

DEERS is DoD's population demographics database. It contains demographic information on all beneficiaries in DoD. Like RCMAS, it provides detailed individual information.

RAPS is the MHS population projection and utilization model. It is a highly aggregated system that conducts scenario analysis and forecasting within the MHS. Using information pulled from other systems, it provides a six year projection of beneficiary population and their impact (medical resources consumption, demand) (OASD (HA), 1994).

Lastly, CHCS is DoD's integrated hospital computer system. Unlike the other systems mentioned, CHCS is an operational system designed to support the day-to-day operations of an MTF (patient scheduling, lab, pharmacy, and administration). It is also the gateway to other information systems within the hospital. This is one of the source systems feeding information to the other database systems.

Based upon these systems, the MHS is developing programs designed to dramatically change the organization. Three key programs are TRICARE, Enrollment Based Capitation (EBC), and Medicare Subvention. TRICARE is a program attempting to adapt certain managed care principles into the MHS operating structure. Using the concept of primary care managers

(PCMs) and cost-shares, the MHS hopes to recapture revenue lost to the civilian health care community and to reduce utilization rates of its beneficiary population. TRICARE is changing the delivery of care but did not change the method in which the MTFs are operationally funded. EBC and Medicare Subvention are the two programs currently in development designed to restructure the financing of care to an at-risk model. EBC and Medicare Subvention will establish a funding mechanism whereby the MTF will be financially rewarded or penalized depending upon its operational efficiencies.

EBC is a prospective budgeting program whereby each MTF's budget will be determined according to the population in their catchment area who have identified the MTF as the facility of choice for medical care (TRICARE Prime). The MTF will lose funding for any beneficiary choosing any other alternatives under the TRICARE system (those choosing the contracted civilian HMO partner (TRICARE Extra) or those desiring complete freedom of choice in either the military or civilian community (TRICARE Standard)). Despite TRICARE Prime's limited patient choice, it is being encouraged because it is the most economical for the patient and most importantly, the MHS.

EBC is a fundamentally new method for developing budgets. The previous historical based budgeting determined an MTF's budget based upon previous expenditures. EBC is very different because it bases the budget upon population served. Following the civilian managed care principles, EBC is a prospective payment system because the facility is funded up-front based upon a per-member-per-month rate. Considering the wide variance of medical costs throughout the nation, a key element of EBC is the calculation of the MTF specific costs. These costs are to be determined from information extracted from various MHS systems; specifically, MEPRS.

The second program, Medicare Subvention, is the MHS' attempt to recoup Medicare costs associated with providing care to the eligible beneficiary population 65 and over. The reimbursable costs involve computations based upon historical level-of-effort (LOE) (OASD(HA), 1996b). The MTF's reimbursement rate will be based upon a percentage of the historical LOE. Like EBC, Medicare subvention uses MEPRS data as a critical component in its formulas.

MEPRS is a key system in many of these programs because it is the only system collecting cost information. The MEPRS consists of source (MTF specific) and replicated (service aggregated) systems. The local database system, Expense and Accounting System version III (EASIII), resides at the MTF's resource management division (RMD). There are two central databases: 1. MEPRS Central System at Fort Detrick, Maryland, and 2. MEPRS Executive Query System (MEQS), located at Health Care Systems Support Activity, San Antonio, TX. The MEQS system is newer and is used by both the Army, and most recently, by the Air Force Medical Commands as their primary source for decision support information. MEPRS Central is an older legacy system still used by the Navy Medical Command. Each service aggregates all its service MTF's data in their respective central databases (future references to MEPRS centralized databases will refer to both MEQS and MEPRS Central).

The systems adage of "Garbage In, Garbage Out" (GIGO) refers to the usefulness of the data if any system starts with poor information. This is relevant to the MHS because in order for OASD (HA) to develop and properly execute reengineering programs, the information supporting them cannot be garbage. Programs such as EBC and Medicare Subvention rely on the assumption of MEPRS accuracy and reliability. The data from MEPRS is integral to the

price calculations in both programs. Unfortunately, recent studies have revealed data quality problems within the various MHS systems.

One study compared the MEPRS against the RCMAS system. MEPRS and RCMAS both collect inpatient visits and bed-days for every MTF. Theoretically, they should both agree with one another; in reality, they rarely match. The differences between the two are attributed towards the differences in reporting methods. The patient information in RCMAS is richer[1] but does not contain any costing information. Any calculations requiring input from the two systems (cost per Diagnosis Related Group (DRG), patient level cost accounting (PLCA)) requires adjustments to consider these differences (OASD(HA), 1996a) (Corey, 1997).

A second study involved the collection of ambulatory workload for the TRICARE program. The TRICARE program involves a partnership between the MHS and a civilian HMO. The civilian HMO assumes financial risk for the population enrolled in its program. One required component of the HMO program is outpatient services. In order to be successful, the HMO needs to know the potential population and their utilization rates (frequency and intensity) so it can position the appropriate amount of resources. It is the responsibility of the MHS to provide this information to the contractor or else risk a monetary penalty ($32 million per month)(Corey, 1997). Unfortunately, the MHS is having a difficult time collecting this information. The Ambulatory Data System (ADS) was fielded in 1995 and is designed to capture this specific information. To date, the MHS is still unable to capture all their ambulatory workload in ADS.

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[1] The RCMAS database captures patient level information while MEPRS only captures summary information.

Considering the impact these systems have on the future of the MHS, the GIGO systems adage has been humorously modified to "Garbage In, Gospel Out". The "Gospel" refers to the decisions and programs implemented based upon these systems. Data quality is very important-- regardless if the data is good or bad, decisions will be made from these systems.

## Statement of the Problem or Question

With regard to the data quality within the MHS, OASD (HA) is instituting a program directly focused on data issues. The program now underway is the Corporate Executive Information System (CEIS). This program is designed to change the way information is delivered throughout the MHS. Currently, the systems used for decision support (MEPRS centralized databases, RCMAS, DEERS) are very difficult to access and use. CEIS is restructuring these systems. An important feature of CEIS is the development of regional Integrated Databases (IDBs). Once CEIS is mature, single centralized systems will no longer exist. Instead there will be region specific IDBs aggregating information on all MTFs within its region. Furthermore, these IDBs will be supported with powerful, user-friendly, querying tools.

To promote data quality in CEIS, the Statistical Quality Control Branch (SQCB) has been created to establish metrics and benchmarks of the data supporting the IDBs. The objective is to "monitor performance, standardize reporting, and to modify behavior" (Corey, 1997). The program bases the metrics and benchmarks from central systems. The benchmarks will be used to gauge and measure an MTF's performance among one another and compared to the MHS system as a whole.

MEPRS is one of the central systems targeted for data quality improvement. As mentioned, the MEPRS system is composed of replicated databases. Each MTF has its own MEPRS system and feeds copies of their local information to the centralized systems, MEQS or

MEPRS Central. The method and systems used to replicate the data from the local system to the central system is different among the three services. The Army, Navy, and Air Force uses different agencies and systems to forward their MTF's MEPRS data to the central system. Though the local MEPRS systems will contain the most current information, the OASD (HA) utilizes the central systems for their decision making purposes. MEPRS is a critical system within the MHS because is the only source of direct care cost information.

Theoretically, the information stored at the central systems should contain the exact information located at each MTF (after considering time delays due to the reporting schedule). Unfortunately, the effect of data replication of MEPRS data has not been investigated. Data consistency between point of collection systems, MTF local MEPRS (EASIII), to the decision support systems (MEQS and MEPRS Central) has not been thoroughly studied. The MHS currently assumes the data on the central systems to be consistent with the local systems. Despite the aggressive programs in place to improve data quality, there are no programs to investigate the reliability of MEPRS information on the replicated, decision support, central databases. Until properly researched, there is the possibility that many programs relying on MEPRS central systems data might be functioning with unreliable data.

The current variability of MEPRS reporting, the use of replicated databases for corporate level decision support, and the importance of the MEPRS system prompts three research questions. All research questions are specific to the data consistency issue of the MEPRS system.

Research Question 1

Are there differences between the data in the local MTF MEPRS systems and the data in the centralized systems that are being used by OASD (HA) for decision support?

Research Question 2

Are there differences in the quality of MEPRS data among the three services?

Research Question 3

What are the causes and impacts of these differences?

## Literature Review

The main issue at hand is the concept of data quality. With the proliferation and growing corporate dependence on databases, data quality is an important issue in all business sectors. The issue of quality must first be defined. Juran defined quality as a "fitness of use" determined by the user (Juran, 1974). Supporting this general concept, Deming defined quality as an "interaction between three participants", the product, the customer, and training of the customer (Deming, 1986). The customer has a strong, if not exclusive, input into the definition of quality. These theories and concepts were more readily applied to physical goods and services. Only recently has quality been applied to data and information.

There is now a specific management discipline regarding quality data - Total Data Quality Management (TDQM). Researchers are trying to define a comprehensive list of data quality attributes. While there are many varying definitions regarding data quality, some are generally agreed upon. Research indicates there are four commonly used characteristics to define data quality. Klein and Rossin identified the four characteristics common in most current research literature to be: completeness, accuracy, currency, and consistency (Klein, Rossin, 1997). Supporting these findings, Berg identified the most common four to be: completeness, accuracy, timeliness, and consistency (Berg, 1997). For all practical purposes, timeliness and currency are considered synonymous. This paper will endorse the four terms espoused by Klein and Rossin (Figure 1). A good definition of the data quality terms is provided by Gardyn:

"1. Correctness: The extent to which the data matches another set of data which acts as a specification or a reference set and the extent to which the data conforms to the business rules as specified by the users

2. Completeness: All data is available to satisfy the user requirements...

3. Consistency: There is a single representation of the same data, or if more than one representation, copies are controlled and have same format and content. The format and content conform to the business rules as defined by the users.

4. Currency: Data is up to date according to the user-specified timing. This may be as close of business previous day, as at the end of last week, etc." (Gardyn, 1997)

Considering the significance of the MEPRS system, its data must be able to properly satisfy the four basic criteria for quality data. One shortfall of this data quality model is it assumes one quality can exist in the absence of others. Specifically, reviewed literature on data quality does not present any hierarchical or dependent relationships among the data quality attributes. This shortfall become obvious when considering MEPRS is being used as a tool to measure the efficiency of the MHS. In addition to the data quality model, a second model must be considered to properly assess the quality of the MEPRS system.

A related model applicable to the MEPRS system is that of a statistical measurement tool. Statistically, a sound measurement tool must have three qualities: reliability, validity, and practicality (Cooper, Emory, 1995) (Figure 2). A tool is considered reliable if it is consistent in its measurements. A tool is valid if it reflects the true state of the object to be measured. A tool is practical if it collects and produces useful information.

Since MEPRS collects workload, cost, and expense information, the practicality requirement is met. The issue of concern becomes MEPRS reliability. From the statistical

model, reliability it is a necessary prerequisite to validity (Cooper, Emory, 1995). If a measurement tool does not produce consistent results, it can never be valid. Related to MEPRS, information extracted at the central systems should produce the exact results if they were pulled from the local systems (again, after considering reporting delays). Until MEPRS is proven to be a reliable database, statistical and workload information derived from the central systems might be inaccurate. Testing the reliability of the replicated MEPRS databases (from the centralized databases) will provide the foundation for any future data quality improvement programs.

The statistical model presents the characteristics of a sound measurement instrument. The data quality model presents the characteristics of quality data. The MEPRS system should satisfy both models. Both models do not have to be considered separately because both have the same elements. Combining the two models produces a third model which the author of this research paper calls the Data Quality System (DQS) model. A comparison of both model's qualities reveals some correlation (Figure 3). Using Deming's and Juran's emphasis on the consumer, "Practicality" is the overarching domain. The database system must produce relevant and useful information. The second domain is database system reliability and consistency—the statistical model considers both terms synonymous. Based upon the statistical model's dependency relationship between reliability and validity, the last domain is validity with its subset attributes of correctness, completeness and accuracy. The significance of the comparison and the resulting DQS model is to highlight the importance of an information system's dependence on quality data if it is to function as a tool to provide measurements about the organization. Second, it provides a hierarchical relationship between the various qualities of data. Specifically, the relevancy of some characteristics depends upon the existence of others.

Using this model can be of value because current strategic and operational decisions are being based upon organizational information systems because they are serving as measurement tools. Improving or achieving quality data is imperative so management can properly support the decision making process. The penalty of poor data is well documented. First, poor data has limited application potential. An untrusted database severely limits management's capabilities to manage the company. A 1993 CIO survey revealed that over half the CIOs believed their information to have limited capabilities because of the lack of accuracy (Nayar, 1993). Most recently, the net worth of one of the nations largest HMO's, Oxford Health Plan, dropped over fifty percent in one day (from $68.75 to $27.875 per share ) because their book keeping systems failed to keep accurate information (Reuters, 1997). Within the industry as a whole, a study indicated the typical data error rate of 1-5% costs the organization an estimated 10% of their revenue (Redman, 1996).

As previously mentioned, MEPRS satisfies the Practicality domain because the expense data collected is useful. Unfortunately, the Reliability issue is still largely unproved. Specifically, it is currently unknown if the data contained in the central systems is consistent with the data contained in the local systems. Reliability must first be proven to support the systems validity. Database attributes such as accuracy, completeness, and currency becomes meaningless unless the system is first reliable.

A recent study by OASD (HA) illustrated the problem of system consistency. As previously mentioned, CEIS is a new system designed to make all MHS performance data readily available to the entire organization. The system extracts information from central and local database systems and aggregates it into region specific databases. The study investigated the integrity of the data between existing systems, RCMAS and RAPS, and compared it to the

newly developed IDBs. The IDBs were expected to produce the same results as the existing systems which it scheduled to replace. Interestingly, the results revealed a differences between the two. The report attributes the deltas to differences in the calculation formulas, formatting, interpretation of data, and system rounding errors (OASD (HA), 1997). Even though the research provides some explanation of the differences, it reveals the problems of database consistency. Until this study was completed, the data generated by CEIS and other source systems were assumed to be the same. This revelation is significant to decision makers. They need to know the limitations and peculiarities of specific database system prior to making any decisions based on the data.

This study exemplifies the importance of verifying data reliability. With regard to MEPRS, strategic decisions are being made on the central systems data; unfortunately, its reliability is still unknown.

## Purpose

The primary purpose of this study is to establish the reliability (consistency) of the entire MEPRS system from point of entry at the MTF, EASIII, to the consolidated HA corporate database systems, MEQS and MEPRS Central. Specifically, this study will analyze expense and workload information from the MEPRS system and attempt to establish data reliability by responding to the three stated research questions.

### Research Question 1

Are there differences between the data in the local MTF MEPRS systems and the data in the centralized systems that are being used by HA for decision support? A null and alternative hypothesis is generated for this question.

$H0_1$: There are no differences between local MTF MEPRS data and its corresponding MEPRS central system data (MEQS or MEPRS Central).

$H1_1$: There are differences between the local MTF MEPRS data and its corresponding MEPRS central system data (MEQS or MEPRS Central).

Research Question 2

Are there differences in the quality of MEPRS data among the three services?

$H0_2$: The level of MEPRS data consistency among the Army, Navy, and Air Force MTFs are the same.

$H1_2$: The level of MEPRS data consistency among the Army, Navy, and Air Force are not the same

Research Question 3

What are the causes and impacts of the differences should any exist?

This is a qualitative research task. It is dependent upon the results of the first two research questions. First, it will involve a thorough analysis of the process to determine the points in the system where the values are changed. Second it will evaluate the rationale for the change and discuss the impacts resulting from the change.

# METHOD AND PROCEDURES

The MHS has 587 MTFs (107 hospitals, 480 clinics) within its system (Corey, 1997). Conducting a comparison analysis of all these facilities would be beyond the resources of this research. This study, therefore, is only selecting the Graduate Medical Education (GME) facilities of the Army, Navy and Air Force. These GME facilities are commonly referred to as Medical Centers (MEDCENS). These facilities offer the most comprehensive care available within the system. Correspondingly, the data in the MEPRS systems of these facilities are more comprehensive compared to the smaller Medical Activities (MEDDACS) that do not offer the full spectrum of care. Within the MHS, there are 14 active GME MEDCENS: 6 Army, 3 Navy, and 5 Air Force. Each MEDCEN is assigned a unique 4-digit Defense Medical Information System Identification Code (DMISID). Appendix A lists all MTFs sampled in this study with their corresponding DMISID facility code

The study will extract the most recent MEPRS close out year information from each facility. A close-out year is defined as a non-current fiscal year. Since this study started during the end of the 1997 fiscal year, it will only consider 1995 and 1996 fiscal years. The purpose of selecting close-out years is to remove the confounder of corrections and updates. A comparison of the data values between the two systems would be difficult and meaningless if the underlying data sets were still undergoing updates and corrections. A stable data source is a necessary pre-requisite for the purpose of analysis. Fiscal years 1995 and 1996 satisfy the data stability requirement.

MEPRS organizes its data by work centers. The MEPRS first digit code identifies the MTF functional categories (Appendix A). Each category, in itself, is further sub-categorized. The MEPRS second digit identifies the all summary accounts within the MTF functional

categories (Appendix B). The most granular, standardized coding method for all MTFs is the 3rd digit in the MEPRS code (third level MEPRS). The MEPRS third digit code identifies the specific work center within the summary account (Appendix C). MEPRS has a fourth digit but it is not standardized and is MTF specifically defined. The fourth digit categorizes each activity within the specific work center in the facility.

The MEPRS system contains over 100 data elements. This research will restrict itself to the five significant fields: expense, occupied bed days (OBD), dispositions, inpatient visits (IPV), and outpatient visits (OPV). The expense field shows the amount of resources, in dollars, the activity has consumed while operating. The OBD and dispositions are workload measurements exclusive for inpatient care activities (MEPRS 1st Digit 'A' categories). Inpatient and outpatient visits are workload measurements exclusive to the ambulatory care activities (MEPRS 1st Digit 'B' categories). These data elements are significant because, from them, workload efficiency measurements can be derived (cost per OBD, cost per disposition, cost per visit).

The test for the first hypothesis ($H0_1$ : Local MEPRS = Central MEPRS), will involve a comparison between the MTF local MEPRS database and its corresponding central database (MEQS or MEPRS Central) up to the work center level. There will be three levels of comparison. First, this study will compare the MEPRS database expense information at the hospital. Next, this study will compare the MEPRS expense and workload information at the functional category level (MEPRS 1st Digit categories: 'A'-Inpatient Care, 'B'-Ambulatory Care, 'C'-Dental Care, 'D'-Ancillary Services, 'E'-Support Services, 'F'-Special Programs, and 'G'-Medical Readiness). Last, this study will conduct its most detailed MEPRS expense and

workload comparison at the work center level (MEPRS 3rd Digit categories: 'Axx', 'Bxx', 'Cxx', 'Dxx', 'Exx', 'Fxx', and 'Gxx')[2].

This series of comparisons will be conducted for fiscal years 1995 and 1996. Specifically, this research will compare the MEPRS Detail 1 report generated at the local facility. The MEPRS 1 is a standard report generated and archived at all the MTFs. The MEPRS 1 includes key information of the facility at the work center, the functional category and at the hospital level. The variables of this study's interest are a component of the MEPRS Detail 1 report. The study will compare the local MEPRS Detail 1 report to similar information at the central databases. MEQS has a selectable standard report that presents its information in the MEPRS Detail 1 report format. The MEPRS Central System has no such report but the information is available through the database by constructing the appropriate queries.

The reader should be aware of the specific peculiarities the MEPRS Detail 1 report presents expense information. As mentioned, the report groups the data by the seven functional categories ('A' through 'G') and also by work center in each of the functional categories. The expense information for the Ancillary Services and Support Services ('D' and 'E' accounts) show values prior to the step-down process-before its costs are distributed to the other five accounts. The information for the Inpatient Care, Ambulatory Care, Dental Services, Special Programs, and Medical Readiness ('A', 'B', 'C', 'E', and 'F' respectively) show values during the post-step down phase after expenses have been distributed. The total hospital expense in the report only summarizes the five aforementioned accounts in the post step-down phase.

[2] The 'xx' refers to any subset of accounts within the specific functional category. For example, AAA is the Internal Medicine work center which is belongs the 'A' Inpatient functional category.

The null hypothesis for Research Question One will be supported if the following criteria are met:

1. At the MTF summary level:

    a. Zero total workload difference between the two systems

    b. Zero total dollar expense difference between the two systems.

2. At the Functional category level ('A' through 'G'):

    a. Zero total workload difference between the two systems

    b. Zero total dollar expense difference between the two systems.

3. At the work center level:

    a. Zero total workload difference between the two systems

    b. Zero total dollar expense difference between the two systems.

This study is comparing the values at three levels because in MEPRS, a difference at a lower accounting level (e.g. at the work center) may not reflect any differences at the higher accounting level (functional categories or the hospital level). Likewise, a match of expense or workload values at the higher accounting level may not necessarily mean a match of the same values at the lower accounting levels.

For the second research question, this paper will compare the expense variances of each service to determine if the differences are uniform among all three services at the significance level of $\alpha = .05$ level. If a significant difference is found, this study will conduct an appropriate post-hoc test to determine significant expense differences of one service to the others. In this test, there are three independent samples (k = 3: Army, Navy, Air Force). The Army MTFs sample consists of 6 items ($n_1 = 6$). The Navy MTFs sample will consist of 3 items ($n_2 = 3$).

The Air Force MTFs sample will consist of 5 ($n_3 = 5$). This study will analyze each service's expense difference at each of the seven functional categories (Inpatient, Ambulatory, Dental, Ancillary, Support, Special Programs, and Medical Readiness).

Since variance of values is the focus, magnitude difference--defined as the absolute value percentage difference between the central MEPRS data compared to the local MEPRS data, will be the metric used to compare data consistency among the three services[3]

Throughout this study, this paper will document the process and procedures in place supporting the MEPRS system. If a data reliability problem is identified, this paper will attempt to identify the specific deficiencies in the process contributing to the problem.

## Limitations

This study has three limitations. First, even though this study collected data from most of the large MTFS (GME MEDCENS), the 14 facilities only represent .02% of all the MTFS within DoD. Inferences on these results can only be applied to the facilities in this study and for fiscal years 1995 and 1996.

The second limitation stems from the distribution of the sample points (Figures 4 through 27). A parametric study is not feasible due to the number of outliers and extreme points. Specifically, the outliers could not be dismissed as anomalies and had to be retained. Additionally, the key measurement metric, magnitude differences (the metric upon which all comparative analysis is to be made) assumes a Chi-square distribution. Because of the natural existence of outliers and the non-normal distribution of the samples, a non-parametric study was selected (Sanders, 1995). This study will only report median values. It will use the Kruskal-

[3] Formula for magnitude calculation: ABS [ ( central data value - local data value ) / central data value ]. The data value can be either expense or workload information.

Wallis, one-way ANOVA test to compare the median magnitude expense and workload differences among the three services. If the Kruskal-Wallis test identified significant differences at the $\alpha = .05$ level, the post-hoc, Mann-Whitney, pair-wise test will be applied on the samples. Because a multiple pair-wise comparison on 3 independent samples (Army, Navy, Air Force) using the original $\alpha$ of .05 would increase the Type I error[4] to 14% (Fisher, Belle, 1993), a Bonferronni adjustment to the significance level is necessary to keep the results of the pair-wise comparison valid. Since the 3 samples would require 3 comparisons (Air Force vs. Army, Air Force vs. Navy, Navy vs. Army) the significance level for each pair-wise was adjusted to $\alpha$=.017 (Fisher, Belle, 1993) to achieve a significance level of $\alpha^*$=.05 for all three multiple comparisons together.

The third limitation of this study is the source of the local MEPRS data. Since this study standardized on the hard copy MEPRS Detail 1 reports submitted by the facilities, it assumes the hard copy contain the most recent information available.

[4] Type I error is rejecting a true null hypothesis. Probability of a Type I error and the level of significance should be the same. (Sanders, 1995)

# THE RESULTS

## Population Sample Sizes

This study attempted to collect MEPRS data from the 14 currently active GME facilities within DoD for fiscal years 1995 and 1996. For fiscal year 1995 the final MTF sample size was n=12[5]. For fiscal year 1996, the final MTF sample size was also n=12[6] but with different MTFs. Table 1 shows the total sample size for this study for all MTFs, all the functional categories, and all the work centers for fiscal years 1995 and 1996. Each MTF has six functional categories ('A' through 'G'). Table 2 shows the average number of work centers per functional category. Each of the GME MTFs had an average of 177 work centers.

Analysis of expense information is going to be presented in median dollar difference and median expense percentage difference. Analysis of workload information is going to be presented in percentage of perfect matches, median workload difference, and median workload percentage difference.

## Results at the Gross MTF Level

Table 3 shows the results comparing the median expense differences at the MTF level for fiscal years 1995 and 1996. Table 4 shows the result of the one-way ANOVA to determine if a significance exists among the three services for the same fiscal years.

For 1995, 10 of the 12 MTFS (83%) had differences less than 1%. All three services had a median magnitude expense percentage difference of .04% between the local and the centralized MEPRS systems. The median percentage differences for the Air Force and Navy were 1.20%

[5] Walter Reed Army Medical Center and Travis Air Force Medical Center had incomplete FY95 MEPR Detail 1 reports.

[6] Eisenhower Medical Center and Bethesda Medical Center were unable to provide their current 1996 MEPR Detail 1 reports

and 0.18% respectively. The Army MTFs had a difference of less than .01%. At the significance level of .05, the Kruskal-Wallis one-way ANOVA did not reveal any significant difference among the three services.

For fiscal year 1996, the median magnitude percentage difference for the three services was less than .01% comparing the local and central MEPRS system. By service, the Air Force and the Army had similar measurements; the Navy had a median magnitude percentage difference of .12%. Like FY95, the one-way ANOVA did not indicate any significant differences among the three services.

Results at the Functional Category Level (1st Level MEPRS)

The next set of computations involved a comparison of the six functional categories ('A' through 'G'). Each MTF distributes costs and workload among these seven accounts. This level provides a finer analysis of the MEPRS data. In addition to expense data, workload data was extracted and analyzed.

Expense

Table 5 shows the results comparing the three services expense information at the functional category level for fiscal years 1995 and 1996. Table 6 shows the result of the one-way ANOVA analysis comparing the magnitude expense percentage difference among the three services. Lastly, Table 7 shows the results of the Mann-Whitney, Post-hoc tests if warranted by the ANOVA.

For FY 95, the three services (n=84) had a median magnitude expense percent difference of 0.41% (Table 5). By service, the Air Force, Navy, and Army MTFs had differences of 0.92%, 0.25%, and 0.18% respectively. The ANOVA analysis at the .05 level revealed a significant P-value of 0.003 (Table 6). The post-hoc, Mann-Whitney, pair-wise tests at the 0.017 level of

significance, indicated the Air Force MTFs had significantly higher median expense percentage differences compared to the Navy and the Army (Table 7). The pair-wise comparison between the Army and Navy did not reveal any significant differences.

For 1996, the three services (n=84) had a median magnitude expense difference of 0.29% (Table 5). By service, the Air Force, Navy and Army had differences of 0.24%, 0.30%, and 0.30% respectively. The three services' median magnitude expense percentage differences was not significant among each other at the 0.05 level (see Table 6).

Workload

The workload analysis applied only to the inpatient and ambulatory functional categories ('A' and 'B' accounts). Table 8 shows the results of the inpatient care functional category workload differences while Table 9 shows the results of the ambulatory care functional category workload differences for fiscal years 1995 and 1996. Inpatient care workload comparisons consisted of occupied bed day and disposition workload. Ambulatory care workload comparisons consisted of inpatient and outpatient visit workload.

For FY95, workload comparisons at the functional level resulted in very low median percentage differences. The median workload magnitude workload percentage differences for occupied bed days, dispositions, and inpatient visits were all less than .01% (see Tables 8 and 9 ). An ANOVA analysis on all the workload comparisons did not result in any significant p-value (see Table 12). Unlike expense comparisons, there was a high rate of perfect matches: 83.30% occupied bed day comparisons, 91.70% disposition comparisons, 83.30% inpatient visit comparisons, and 91.70% outpatient visit comparisons were perfect matches at the functional category level for FY95 (see Tables 10 and 11). Of note, all Navy MTFS had perfect matches on all their workload accounts.

For FY96, the workload comparisons also resulted in very low variances. The median workload percentage difference for all workload measurements were all less than .01% (see Tables 8 and 9). Like in FY95, an ANOVA analysis did not result in any significant differences among the three services. Rates of perfect matches were 50% for occupied bed day comparisons, 75% for disposition comparisons, 91.70% for inpatient visit comparisons, and 91.70% for outpatient visit comparisons at the functional category level for FY96. Of note, all occupied bed day comparisons for the three services had perfect matches.

## Results at the Work Center Level (3rd Level MEPRS)

Analysis at the work center level, MEPRS 3rd digit, had to be divided in two separate groups because of the structure of the MEPRS Detail 1 report. As previously stated, the expense values of the 'Axx', 'Bxx', 'Cxx', 'Fxx', and 'Gxx' work centers are after the step-down process. The values in the 'Dxx' and 'Exx' (ancillary and support) work centers, though, are prior to the step down process. At step-down, all the 'Dxx' and 'Exx' work centers have their expenses distributed to the other 5 accounts. Therefor, the expense values contained in the step down accounts already contain the ancillary and support work centers expenses. Since evaluating all seven groups together would double count ancillary and support work centers, the two groups need to be analyzed separately.

### Ancillary and Support Accounts

Table 13 shows the results comparing the three services expense information of all the 'Dxx' and 'Exx' work centers for fiscal years 1995 and 1996. Table 14 shows the result of the ANOVA analysis comparing the median magnitude expense percentage difference among the three services. If warranted by the ANOVA, Table 15 shows the results of the post-hoc, Mann-Whitney, pair-wise comparisons of the same measurements.

For 1995, the median magnitude expense percentage difference for the three services (n=699) was 0.24%. By service affiliation, the Air Force, Navy, and Army had differences of 0.67%, 0.25%, and 0.09% respectively. The ANOVA analysis, at the .05 level, resulted in a significant P-value of less than .001 (see Table 14). The post-hoc, Mann-Whitney, pair-wise test at the .017 level indicated the Air Force MTFs to have the significantly higher expense differences compared to the Army and the Navy. Furthermore, a pair-wise test between the Army and Navy resulted in the Army having a significantly lower expense difference (see Table 15).

For 1996, the median magnitude expense percent difference for the three services (n=694) was 0.21% (Table 13). By service affiliation, the Air Force, Navy, and Army had median differences of 0.17%, 0.20%, and 0.24% respectively. The ANOVA analysis for this group did not result in a significant P-value (see Table 14).

Since the ancillary and support services do not contain patient workload information, a workload comparison is not applicable.

Step Down Accounts

Screening of expense information resulted in removal of 4 items in fiscal year 1995 samples and 9 items in fiscal year 1996 samples. This study relies on two assumptions for a proper analysis. First, expense values must be all positive[7]. Second, there must be values in both the local and central MEPRS system[8]. For 1995, the 4 anomalies included 2 work centers with negative expense values and 2 with zero expense values in their local MEPRS database. For

[7] In MEPRS, negative expense values should never exist for any active work center.

[8] If there is a value in one database, there must be a corresponding non-zero value in the corresponding database. An active work center will have an expense value. A work center cannot be active in one database and inactive in the other.

1996, the 9 anomalies included 4 work centers with zero expense values in their local MEPRS, 3 work centers with zero expense values in their central MEPRS, 1 work center with a negative expense value in its local MEPRS, and 1 work center with a negative expense in its central MEPRS' database. The sample sizes for these work centers (n=1401 for 1995 and n=1425 for 1996) reflect these adjustments (see Table 1).

Expense analysis

Table 16 shows the results comparing the three services expense information of all the 'Axx', 'Bxx', 'Cxx', 'Fxx', and 'Gxx' work centers for fiscal years 1995 and 1996. Table 17 shows the result of an ANOVA analysis comparing the median magnitude expense percentage differences among the three services. If warranted by the ANOVA, Table 18 has the results of the post-hoc, Mann-Whitney, pair-wise tests for the same measurements.

For 1995, the median magnitude expense percentage difference for the three services (n=1401) was 1.01%. By service affiliation, the Air Force, Navy, and Army had differences of 1.86%, 0.78%, and 0.75% respectively. The ANOVA analysis at the 0.05 level resulted in a significant P-value of less than .001 (see Table 17). The post-hoc, Mann-Whitney, pair-wise comparison at the 0.017 showed the Air Force MTFS to have significantly higher expense differences compared to the Navy and the Army (see Table 18). The differences between the Army and the Navy MTFs were not significant.

For 1996, the median magnitude expense percent difference for all three services (n=1425) was 1.04% (see Table 16). By service affiliation, the Air Force, Navy, and Army had differences of 1.30%, 0.84%, and 1.01%. The ANOVA analysis at the 0.05 level resulted in a significant P-value of .001 (see Table 17). The post-hoc, Mann-Whitney, pair-wise test at the 0.017 indicated the Air Force MTFs to have significantly higher differences compared to the

Navy MTFs (see Table 18). No other pair wise comparisons resulted in any significant differences.

Workload analysis

Workload analysis was only applicable to the inpatient and ambulatory care work centers ('Axx' and 'Bxx). Table 19 shows the results of inpatient care work center workload differences (occupied bed days and dispositions) while Table 20 shows the results of ambulatory care work center workload differences (inpatient visits and outpatient visits) for fiscal years 1995 and 1996.

Similar to the workload comparisons at the functional category level, work center workload comparisons resulted in very low differences. For both fiscal years, all workload comparisons resulted in a median magnitude workload percent difference of less than .01% for all the three services (see Tables 19 and 20). The statistical program, SPSS version 8.0, would not report anything past the 5th significant digit. Despite this extremely low percentage, variance among the services produced significant differences.

For FY95, the Kruskal-Wallis test at the .05 level of significance identified significant differences among the three services workload variance in occupied bed day, inpatient visits, and outpatient visit comparisons (see Table 21). Since the majority of service median values were less than the .01% reportable values, the results of the pair-wise comparison had to be paired with the boxplot distributions to infer direction of significance (higher, lower). The pair-wise comparisons for occupied bed day workload differences were significant between the Army MTFs and both the Navy and the Air Force (see Table 22a); direction of significance appears to be higher for the Army (see Figure 20). The pair-wise comparisons for inpatient visit workload differences was significant between the Air Force MTFs and both the Army and the Navy MTFs (see Table 22b); direction of significance appears to be higher for the Air Force (see Figure 24).

Lastly, the pair-wise comparisons for outpatient visit workload differences were significant between the Air Force and the Navy MTFs only (see Table 22c); direction of significance appears to be higher for the Air Force (see Figure 26). The level of significance was at the .017 for each pair-wise comparison. Other than those reported, no other comparisons resulted in significant differences.

The workload comparisons for fiscal year 1996 also resulted in very low median differences. As mentioned, for all three services, the median magnitude percentage differences for all workload comparisons were less than .01%. The Kruskal-Wallis test only found significant differences in disposition workload differences for this fiscal year (see Table 21). Again, due to the limitations of the reports, the results of the post-hoc, Mann-Whitney, pair-wise tests had to be compared to the boxplot distribution to infer direction of significance. The pair-wise comparison for disposition workload differences was significant between the Air Force MTFs and both the Army and Navy MTFs (see Table 23); direction of significance appears to be higher for the Air Force (see Figure 23). Level of significance during the pair-wise was at .017.

The extremely low differences was primarily due to the very high percentage of perfect matches in both fiscal years (see Tables 24 and 25). In FY95, 93.40% (n = 366) of occupied bed day comparisons, 99.70% (n = 391) of disposition comparisons, 97.50% (n = 576) of inpatient visit comparisons, and 97.50% (n=580) of the outpatient visit comparisons were perfect matches (see Tables 21 and 22). In FY96, 100% (n=400) of occupied bed day comparisons, 95.30% (n=381) of disposition comparisons, 99.07% (n=591) inpatient visit comparisons, 99.20% (n=588) outpatient visit comparisons were perfect matches (see Tables 24 and 25).

# DISCUSSION

## Interpretation of Results

The results of this study reveal discrepancies between the local MEPRS and corresponding service affiliated MEPRS central system (MEPRS Central or MEQS). The degree of variance between source and replicated database varies depending upon the level of MEPRS detail analyzed. At the highest summary level, the MTF, the expense data from MEPRS replicated central database is expected to vary from its source MTF by a median value of 0.04% and less than .01% for fiscal years 1995 and 1996 respectively (see Table 3). At the more granular, post-step down, work center level (MEPRS 3rd digit), the median expense percentage variance is expected to be 1.01% and 1.04% for the same fiscal years. Discrepancy variances are over 50% times greater at the work center level as compared to the same analysis at the MTF level. Clearly, a gross analysis at higher summary levels (MTF or functional categories) may not reveal the actual state of data inconsistencies existing at the lower levels.

Assessment of data integrity at the MTF summary level can be misleading because positive and negative deltas negate each other at the lower accounting levels. Specifically, at the work center level, a $1,000 positive difference at one work center will negate a $1,000 negative difference from another work center. Simply comparing summary information at the hospital level will not reveal the true degree of variance within the system. Analysis at the work center level provides a more accurate state of data quality within the MEPRS system. Additionally, the results of work center expense analysis is the more significant because it involves a higher sample population (n > 1400) compared to the analysis at both the MTF level and functional category level.

Though this research focused on percentages as the standard benchmark metric, dollar differences are also significant. At the MTF summary level, the median magnitude expense difference for fiscal year 1995 was $133,836. For 1996, the difference dropped dramatically to $427.23. At the work center level, the median magnitude expense difference was $6,738.45 for fiscal year 1995 and $7,631.92 for fiscal year 1996. This analysis exemplifies the possible misleading status of data quality if one solely relies on summary level views. Even though it appears the MTFs had dramatically lower discrepancies in 1996 compared to 1995 at the MTF summary level; analysis at the work center level indicates the opposite. Using the step down work centers, the dollar discrepancy grew slightly by $1,000. For 1996, each work center is expected to deviated by a median of $7, 631. Accurate analysis of MEPRS data consistency requires analysis at the lowest level and balancing percentage metrics to actual dollar differences.

During the course of the data collection, many of the MTF's MEPRS staff regarded the MEQS or the MEPRS Central system to have the exact information as their local systems. This study suggests this assumption is false for fiscal years 1995 and 1996. Expense variance ranged from 0 to 4,000%. Service affiliation also had an impact on the degree of expense variation. When the Kruskal-Wallis identified significant median magnitude expense percentage differences, the post-hoc, Mann-Whitney, pair-wise test indicated the Air Force affiliated MTFs had significantly higher expense variances in the majority of comparisons in both fiscal years 1995 and 1996.

Interestingly, workload data, did not produce the same degree of variation as seen with expense data comparisons. All the workload comparisons for both fiscal years resulted in a median magnitude workload percentage difference of less than .01% between the local and the central MEPRS systems. Differences among the services did exist though. In the majority of the

pair-wise comparisons for both fiscal years 1995 and 1996, the Air Force MTFs median workload differences were significantly different compared to the other two services. Unfortunately, due to the limitation of the statistical reports (difference lower than the reportable .01 level), we can only infer from visual distributions that the Air Force MTFs workload differences were higher.

MEPRS' reliability problems appears to stem from the expense information while the workload information remains fairly consistent.

## Causes of Variance

Prior to this research, data consistency problems between the local and MEPRS systems were mostly anecdotal. Using the GME facilities, this study suggests variances do exist; data consistency must be considered as part of the variables affecting data quality within the MEPRS system. In the course of this research, interviews were conducted to identify the possible causes and to investigate rumors concerning the reliability between the MEQS and the MEPRS Central database.

First, there has been a standing debate concerning which decision support MEPRS system is more reliable than the other. MEQS is a newer program and assumptions have been made about its superior data quality levels compared to the MEPRS Central. In fact, the Army made their transition to MEQS in 1993, the Air Force in 1997, and the Navy has recently agreed to start selectively using MEQS in 1998 (M. Ireland, Office of the Surgeon General, April 17, 1998). From the perspective of data reliability, there does not appear to be any conclusive evidence the MEQS system is any better than the MEPRS Central system. As earlier mentioned, when the Kruskal-Wallis ANOVA test indicated a significant expense and workload difference among the three services, the post-hoc, Mann-Whitney, pair-wise test showed the Air Force

MTFs, based on MEQS, to have significantly higher variances in the majority of the comparisons in both fiscal years 1995 and 1996. Also, the reverse could not be supported—MEPRS Central is not any more reliable than MEQS). The majority of expense and workload comparisons between the Navy MTFs, based on MEPRS Central, and the Army MTFs, based on MEQS, for fiscal years 1995 and 1996, did not result in any significant differences. The hardware platform of the decision support database does not appear to be a dependent variable on the quality of data MEPRS data consistency.

Variance can result from the rounding differences between the local and the central MEPRS systems. The information from the local MEPRS Detail 1 rounds the expenses to the nearest dollar while the central systems rounds expense information to the nearest cent. These rounding differences would make it impossible for the dollar values between the local and MEPRS system to perfectly match. If this were the only cause of expense difference, the levels of expense variance would be uniform for each MTF and among the three services. From this study, the varying level of MEPRS expense consistency indicates the involvement of other factors.

The significant levels of variance appears to be due to the complex data processing and reporting procedures of the MEPRS system (R. K. Bacon, USA MISA MEPRS Office, March 27, 1998 and U. Henry, USA MISA MEPRS Office, April 16, 1998). Figure 4 diagrams the process involved in completing a monthly report at the local facility. Data is collected and reported in monthly increments. Each monthly computation involves a reconciliation of the various data subsystems feeding the main MEPRS server (Expense and Accounting System III - EAS III). This is followed by some quality control through edits and data inspections to remove or correct erroneous data. Afterwards, computations are performed to distribute costs to the

appropriate accounts and to calculate all secondary data elements (productivity measurements, ratios). Third, hard copy reports are produced for local reference. Lastly, that month's data and all calculated fields are transmitted forward to the respective service aggregated data centers.

Unfortunately, the process is very resource intensive and does not easily support off cycle reporting for ad-hoc data requests. In fiscal years 1995 and 1996, the average monthly computation could take between 3 to 6 hours depending on the type of hardware supporting the MEPRS office (R. K. Bacon, USA MISA MEPRS Office, March 27, 1998 and U. Henry, USA MISA MEPRS Office, April 16, 1998). For a year-to-date or annual computation, the process could take between 6 - 12 hours. If any data element had to be corrected or updated, reports reflecting the change could not be produced until a re-computation for the month had been done. Additionally, a correction to one month often requires re-computations to all following months. Each month's re-computation required a separate transmission to the service data center to update the replicated database's records.

Since there are no recalculations being done on the replicated databases[9], the strongest evidence for data inconsistency is that the MTFs fail to appropriately retransmit some or all their corrections. If a facility did make changes to a previous month's data but failed to submit it, there would be inconsistencies to that specific month, year-to-date, and annual reports generated by the two systems.

A second cause for data inconsistencies is the heavy reliance on the hard copy reports. All reports are completed and printed at the time of computations. As long as the underlying data does not change (e.g. no corrections) the hard copy is good reference. Since the local

[9] The only thing done differently is rounding. The local MEPRS rounds to the dollar while MEQS and MEPRS Central round to the penny.

MEPRS has very weak querying tools, the hard copy is the primary reference for all data requests at the facility. Unfortunately, as this research has verified, some facilities fail to make or properly maintain a current hard copy after making changes. As should be expected, the hard copy will show discrepancies if matched against the central MEPRS database.

A third factor is the system limitations of the EASIII. The system can only maintain the two most current fiscal year's information. Access to previous year data on the local system is either very difficult or impossible. The third year is archived, and any data over four years old is no longer accessible. The archived data is very difficult to install because the skills required for this task is not present at the local facility and the task itself is very resource intensive[10]. For any fiscal year data not actively maintained on the system, the hard copy becomes the defacto primary local source reference. If the hard copy reference was not current, the data becomes inconsistent with the information at the central MEPRS database.

The reliance on hard copy information at the local facility can cause problems as witnessed during this research. One MTF was dropped from the study because they were unaware of a gross inaccuracy of their FY96 local MEPR Detail 1 report. The copy provided was prior to a significant annual correction. In 1997, a correction of $400 million dollars was made to the 1996 record. The update was transmitted to MEPRS Central but the facility failed to maintain a hard copy. Unfortunately, FY96 information is now archived. Since they are unwilling to go through the painful archive restoration procedure, they do not have local records of the status of their database for that fiscal year. Interestingly, they submitted the old report believing it to be the most current report.

[10] Madigan Army Medical Center currently attempted this task. It took 2 weeks to re-install FY 96 data on their EAS III.

## Research Questions

### Research question 1

#### Expense Information

The null hypothesis is rejected. Expense data at the local and central MEPRS databases are not consistent. At the MTF, the functional category, and work center level, there are notable median magnitude expense differences between the local MTF MEPRS system compared to the hospitals service affiliated central MEPRS (MEPRS Central or MEQS).

#### Workload Information

The null hypothesis is rejected. Even though the reported median workload percentage difference was less than .01% for all workload comparisons for both fiscal years, differences did exist. The extremely low rate of difference suggests the workload information, though not a always a consistent match between the local and central MEPRS system, is much more reliable than the expense information.

### Research question 2

#### Expense Information

The null hypothesis is rejected. Expense variances between the three services is not the same. MEPRS data consistency is significantly different among the three services at alpha = .05 at the functional level for FY95, at the step down work center level for both fiscal years, and at the ancillary and support work center level for FY95. The post-hoc, Mann-Whitney, pair-wise comparison at the 0.017 significance level indicated the Air Force MTFs to have the higher expense variances for the majority of tests for fiscal years 1995 and 1996.

Workload Information

The null hypothesis is rejected. Due to the very small workload percentage difference (less than .01%) and the limitation of the statistical reports, direction of significance could only be inferred. Comparing the significant results from the pair-wise comparisons with the workload boxplot distributions, it appears that the Air Force MTFs had a higher percentage of workload variance compared to the Army and Air Force for most of the workload comparisons for both fiscal years 1995 and 1996.

Research question 3

Causes of variance could not be definitively identified but this study's research strongly suggests two likely causes. The first likely cause of variance may stem from the failure of the MTF to transmit re-computations of all monthly corrections to the MEQS or MEPRS Central. The second likely cause of the variance may stem from the failure to maintain current hard copy MEPRS reports for primary reference.

# CONCLUSIONS AND RECOMMENDATIONS

## Conclusions

The purpose of this research study was to investigate one aspect of data quality within the MEPRS system. Prior to this research, most in the MHS assumed that MEPRS accurately replicated the data between the local MTF and its centralized systems. Correspondingly, inaccurate information was attributed to poor data entry. But, until MEPRS reliability (consistency) has been verified, any resources invested to improve data input accuracy might not adequately solve the data quality problems plaguing MEPRS. MEPRS reliability must first be validated in order for other data quality improvement efforts to be successful. This research investigated MEPRS reliability by comparing expense and workload information of the 14 GME MEDCENS between the local and centralized MEPRS systems for fiscal years 1995 and 1996.

The results of this study indicate there are problems with MEPRS reliability. Specifically, the data between the local MEPRS system at the MTFs (EASIII) is inconsistent with the same data at the replicated databases at the central systems (MEPRS Central and MEQS). The problem is more pronounce with expense data while workload information is relatively consistent. Additionally, the more granular the analysis, the greater the variance. The median expense difference between the local and central MEPRS systems at the 3rd digit, work center level, was up to 50% greater than the difference at the MTF summary level.

Even though this paper identified consistency problems with the MEPRS database for fiscal years 1995 and 1996, the median differences reported (approximately 1% for expenses and less than .01% for workload) is considerably lower compared PASBA's 5% benchmark data quality threshold. Unfortunately, the stronger parametric measurements of means and standard deviations could not be reported because of the outliers within the sample group. Despite the

low aggregate median differences, the outliers had expense differences as great as 4,000%. Since these data points could not be dismissed as anomalies, managers and leaders should expect similar outliers to re-occur in the population.

This research also found significant differences between the services. For the majority of the expense and workload comparisons for both fiscal years 1995 and 1996 (when significant differences occurred) the post-hoc, pair-wise comparisons identified the Air Force MTFs to have higher variances compared to the Army and the Navy MTFs.

The cause of the differences could not be definitively identified but investigation into the MEPRS reporting and data replication procedures suggests the cause to be from the complexity and rigidity of the MEPRS reporting process. Based upon interviews with USA MISA and local MTF MEPRS staff, differences between the local and central systems can be attributed to the failure of the local MTF to properly submit monthly updates and/or fail to maintain current hard copy reports for their local primary reference.

## Recommendations

The data driven programs such as Medicare Subvention, TRICARE, and Enrollment Based Capitation has made the MEPRS database a critical system for corporate decision making. Unfortunately, as indicated by this research, the database used for decision support (centralized MEPRS systems) contains different information compared to local systems. This research has three recommendations to help correct the data consistency problems and improve overall data quality within the MEPRS system.

First, leadership must be aware of consistency problems between local MTF MEPRS and their corresponding centralized systems. Even though the median percentage variance is approximately 1%, the prevalence of outliers requires special consideration at the work center

level. The very low variance at the MTF summary level should cause little concern if resources are distributed based upon MTF summary performance. However, due to the higher expense variations at the 3rd digit, MEPRS work center level, some departments or clinics might be improperly punished or rewarded if resources are distributed according to work center performance. Any critical management decisions based upon centralized MEPRS information should be cross-checked with the local MEPRS system.

Second, this research recommends the inclusion of MEPRS data comparison into its data quality management efforts. This effort should include both monthly and annual MEPRS data comparisons. Regular data comparisons should improve the system in two ways: 1) it will either correct the data reliability problems within the MEPRS system and/or, 2) help identify the specific system shortfalls causing the consistency problems. Either outcome will benefit the MHS because it will ensure Health Affairs is working on current information and help identify the source of data reliability problems. Additionally, this study can be the foundation of future data quality improvement programs. The results of this research can be used as baseline metrics to monitor the progress of future data quality improvement efforts.

Third, this research recommends an improvement to the local MEPRS EASIII system. The reliance on historic, hard copy information and the inability to generate ad-hoc query reports are obstacles in any data quality improvement program. Department chiefs should have readily accessible data on demand and should not have to rely on dated hard copy information. Additionally, improved access to the system for managers and leaders within the MTF will enable them to become more educated concerning MEPRS. It will provide them the tools to be more proactive in the management of their own data. Despite the importance of MEPRS in the MHS, the only people operationally familiar with the system are the scarce MEPRS staff clerks.

Regardless, since EASIII is not Year 2000[11] compliant, the MTFs will soon have a new local MEPRS system. It is hoped EASIV will live up to the promises made.

These recommendations are consistent with the current efforts underway to make the operational leadership (MTF commanders and executive staff) more aware and responsible for their data. As an example, the Corporate Executive Information System (CEIS) is a new program that extracts hospital information from many different system (including MEPRS) and repackages it into a more user-friendly system. The purpose of CEIS is to assist the MTF leadership in evaluating the performance of their hospitals through a user friendly and robust information system with extensive querying and reporting capabilities. As mentioned, the two programs putting an impetus to 'data awareness' are Enrollment Based Capitation and Medicare Subvention. Both programs will establish operational budgets based upon the information produced by the MEPRS system. CEIS can be an effective tool in this endeavor but is subject to the same weaknesses of MEQS and MEPRS Central. CEIS is only useful if it accurately reflects the same information collected from the various source systems.

In conclusion, despite the shortfalls within the MEPRS, it is the only expense accounting system available to the MHS. MEPRS is now being used in ways it was never originally designed. Additionally, external agencies, such as the Government Accounting Office (GAO) and the Health Care Finance Agency (HCFA), are using MEPRS to audit the MHS. It is the MHS best interest to insure MEPRS contains the highest quality data possible. This research has provided valuable information that can be used to help improve one of the foundations of MEPRS data quality – data reliability.

[11] EASIII cannot properly resolve any calculations with date data elements involving 2000 and beyond.

Figure 1

The Data Quality Model

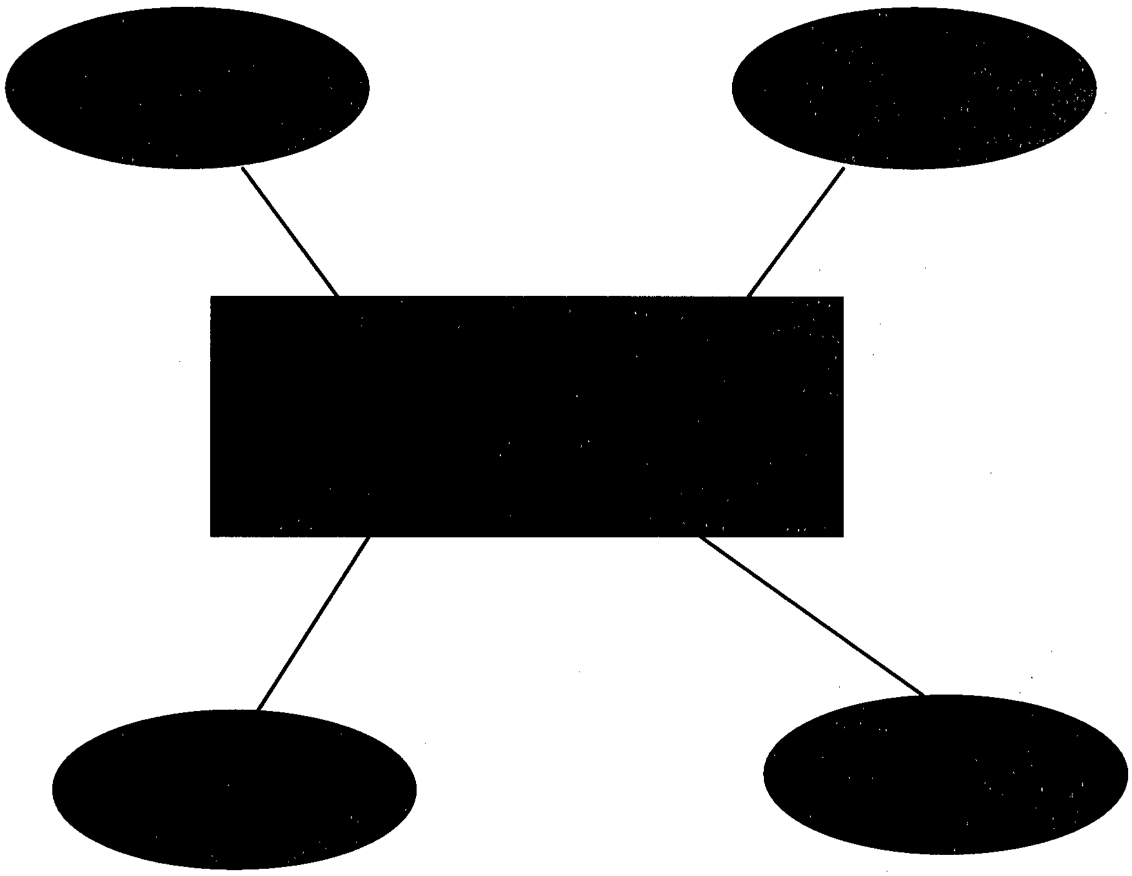


Figure 2.

The Statistical Measurement Tool Model

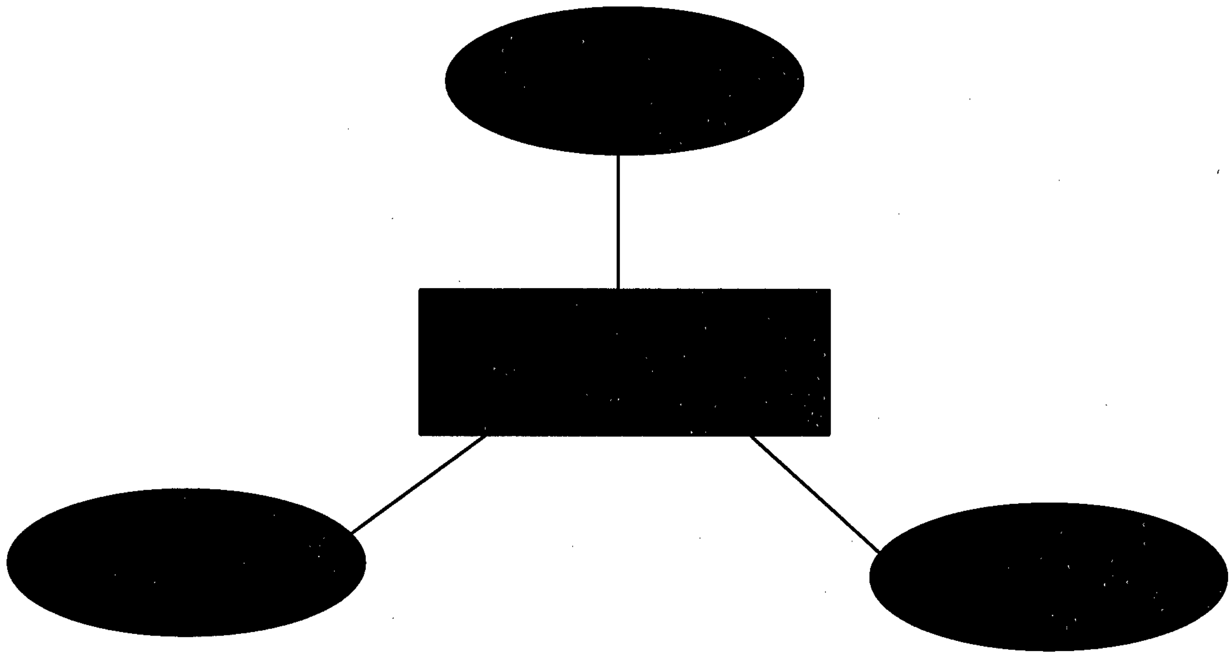
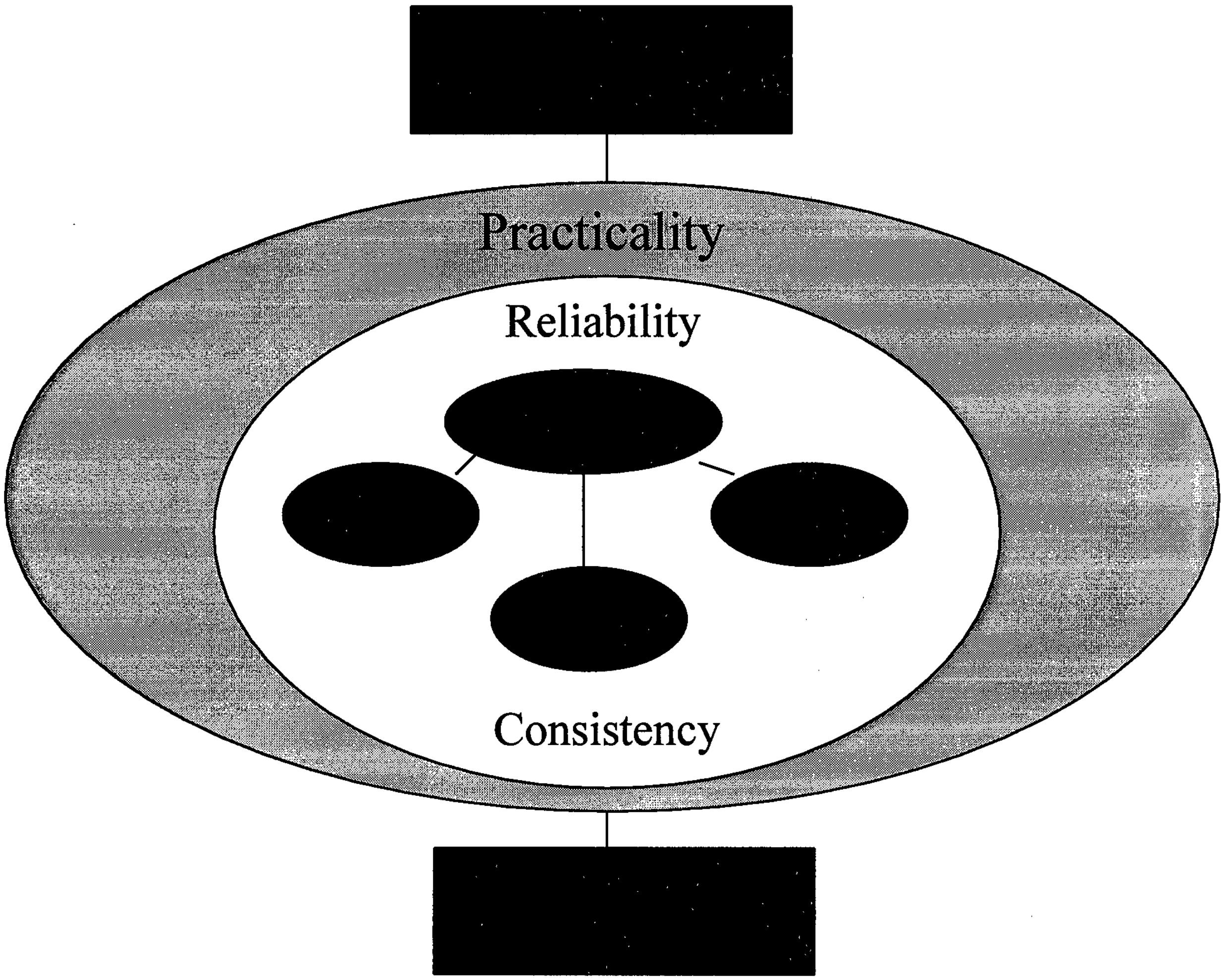


Figure 3

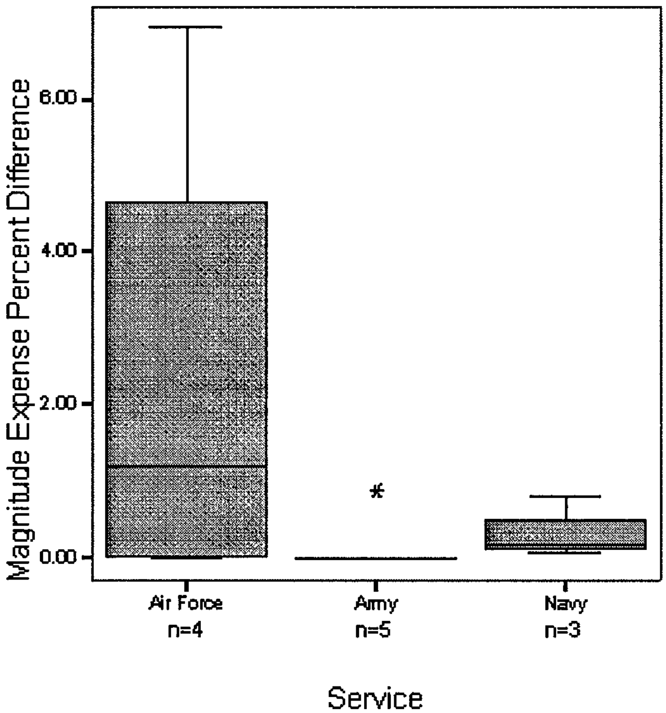
The Data Quality System (DQS) Model




* Each inner circle attribute has a dependency relationship with the outer circle attribute

Figure 4

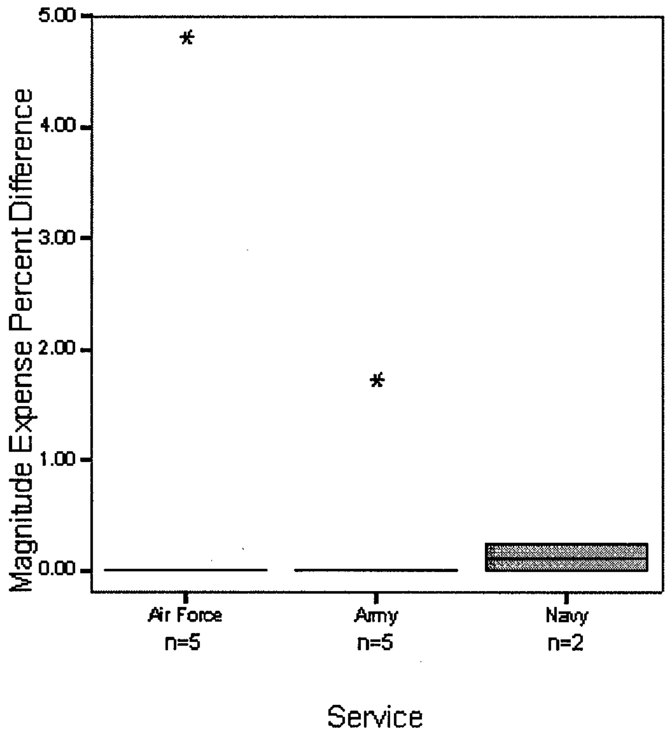
Boxplot distribution of FY95 expense differences at the MTF summary level




* - Represents extreme data points
o - Represents outlier data points

Figure 5

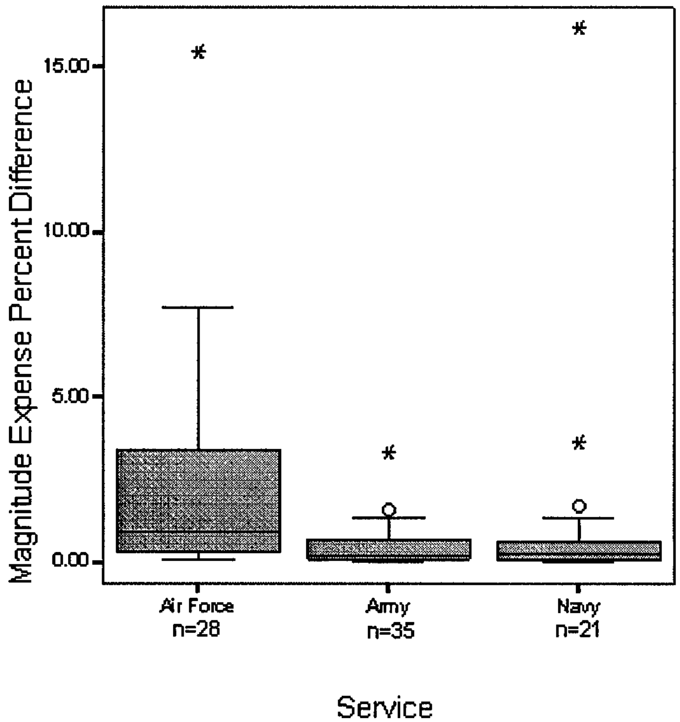
Boxplot distribution of FY96 expense differences at the MTF summary level




* - Represent extreme data points in the sample
o - Represent outlier data points in the sample

Figure 6

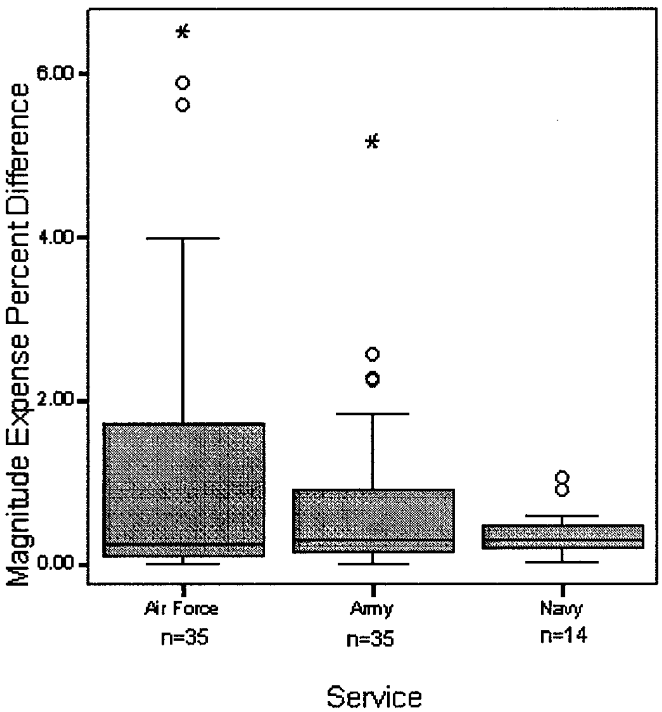
Boxplot distribution of FY95 expense differences at the functional category level




* - Represent extreme data points
o - Represent outlier data points

Figure 7

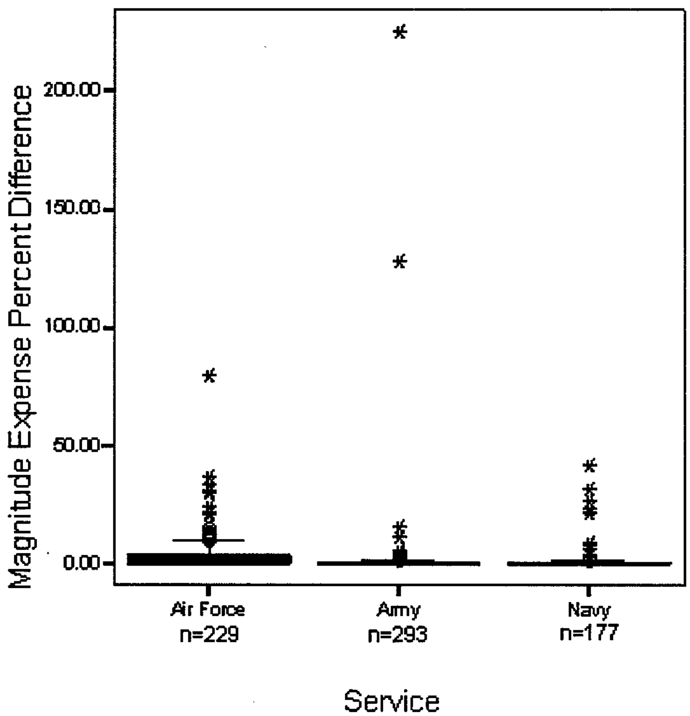
Boxplot distribution of FY96 expense differences at the functional category level




* - Represent extreme data points
o - Represent outlier data points

Figure 8

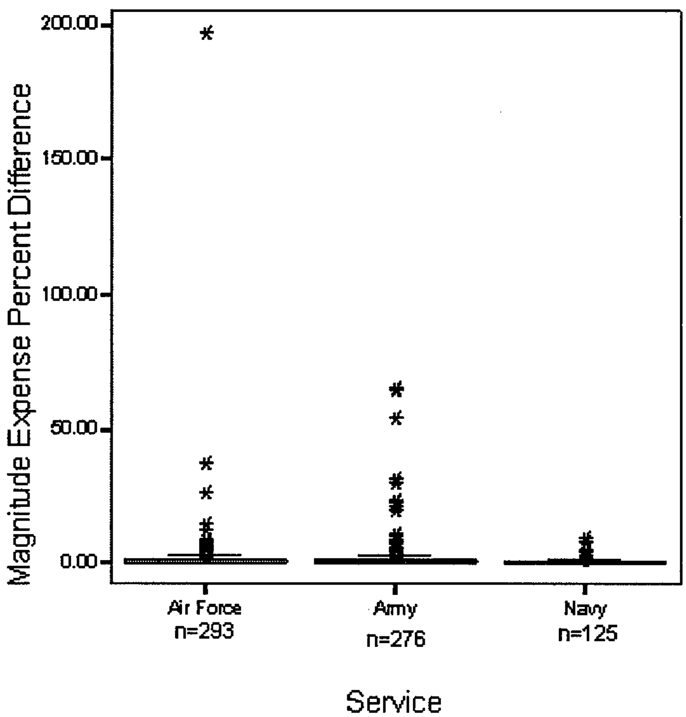
Boxplot distribution of FY95 expense differences at the ancillary and support work center levels ('D' and 'E' accounts)




* - Represent extreme data points
o - Represent outlier data points

Figure 9

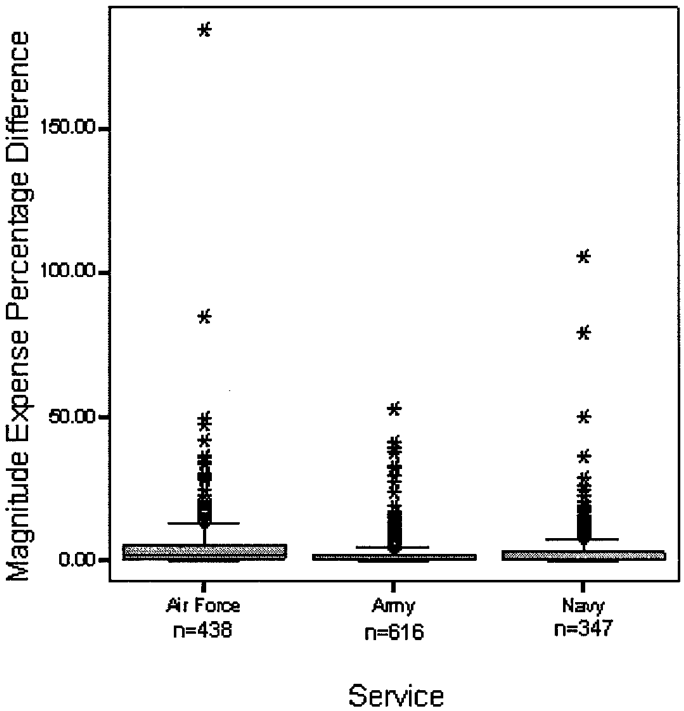
<u>Boxplot distribution of FY96 expense differences at the ancillary and support work center level ('D' and 'E' accounts)</u>




* - Represent extreme data points
o - Represent outlier data points

Figure 10

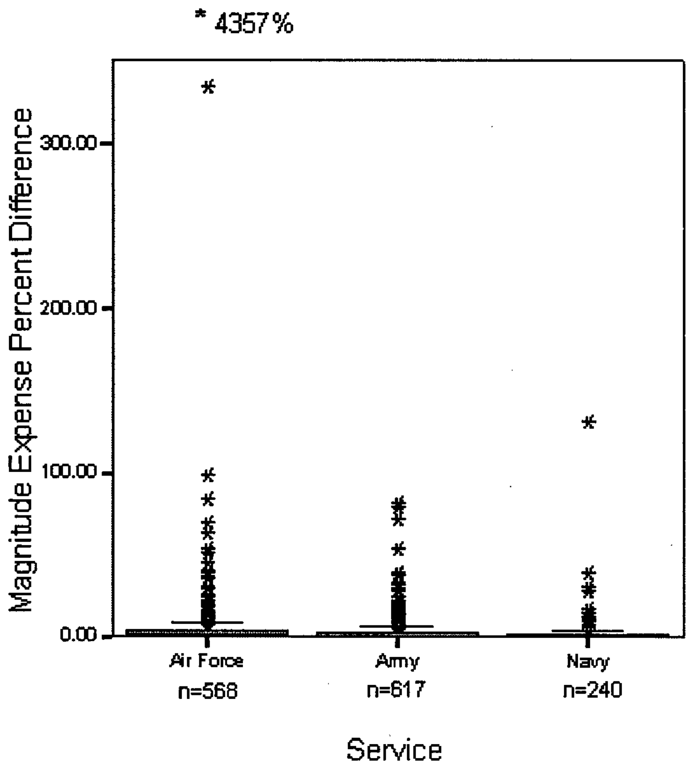
Boxplot distribution of FY95 expense differences at the step-down work center level ('A', 'B', 'C', 'F', and 'G' accounts)




* - Represents extreme data points
o - Represents outlier data points

Figure 11

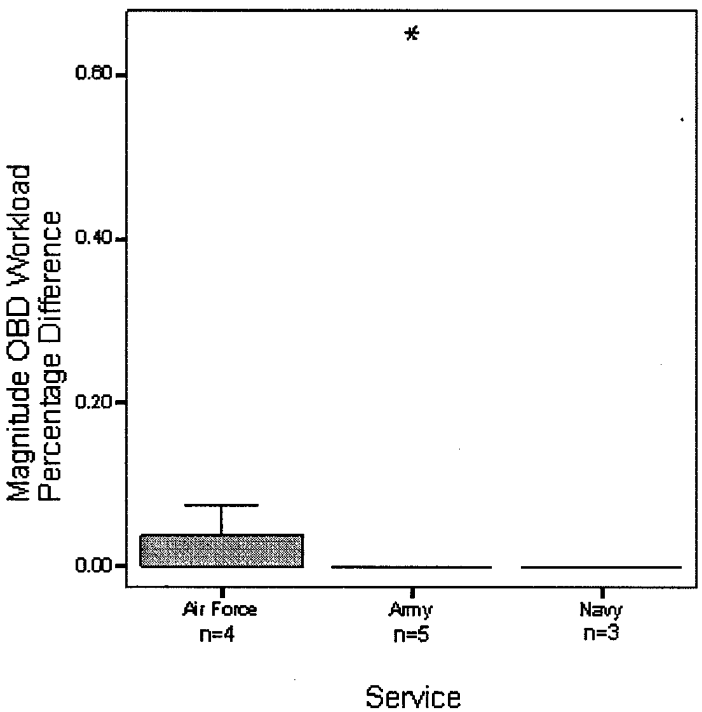
Boxplot distribution of FY96 expense differences at the step-down work center level ('A', 'B', 'C', 'F', and 'G' accounts)




* - Represents extreme data points
o - Represents outlier data points

Figure 12

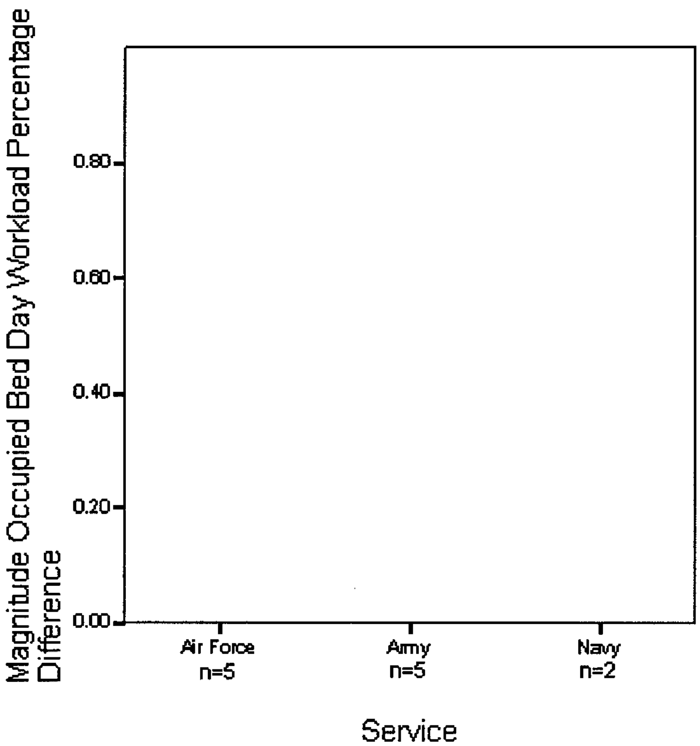
Boxplot distribution of FY95 Occupied Bed Day workload differences at the functional category level




* - Represents extreme data points
o - Represents outlier data points

Figure 13

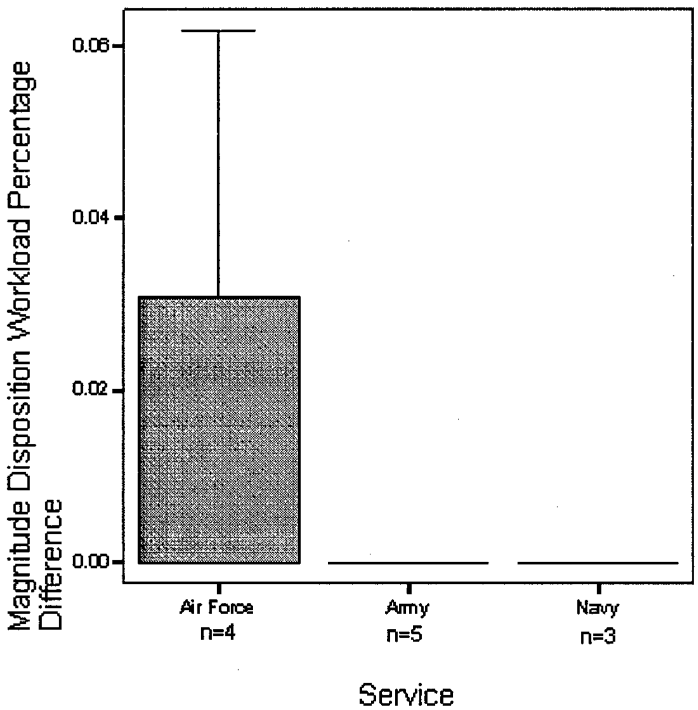
Boxplot distribution of FY96 Occupied Bed Day workload differences at the functional category level




* - Represents extreme data points
o - Represents outlier data points

Figure 14 .

<u>Boxplot distribution of FY95 Disposition workload differences at the functional category level</u>

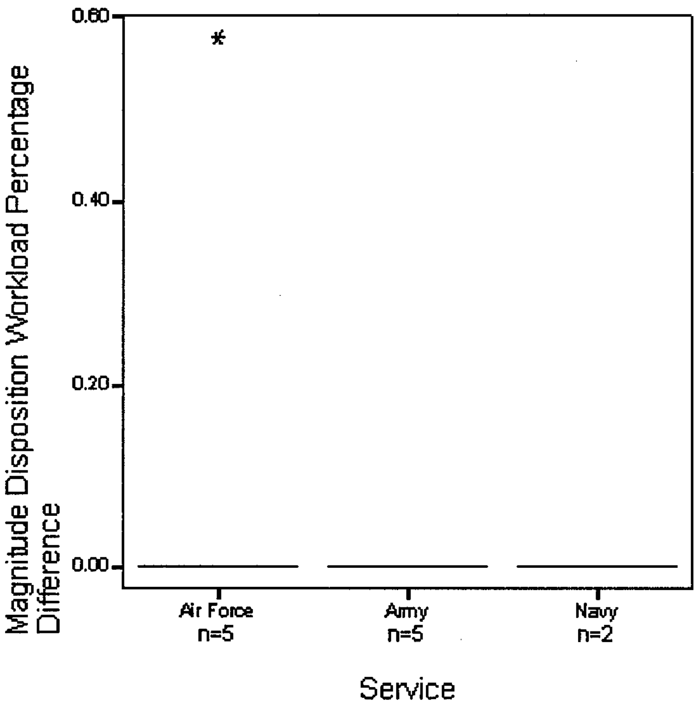



* - Represents extreme data points

o - Represents outlier data points

Figure 15

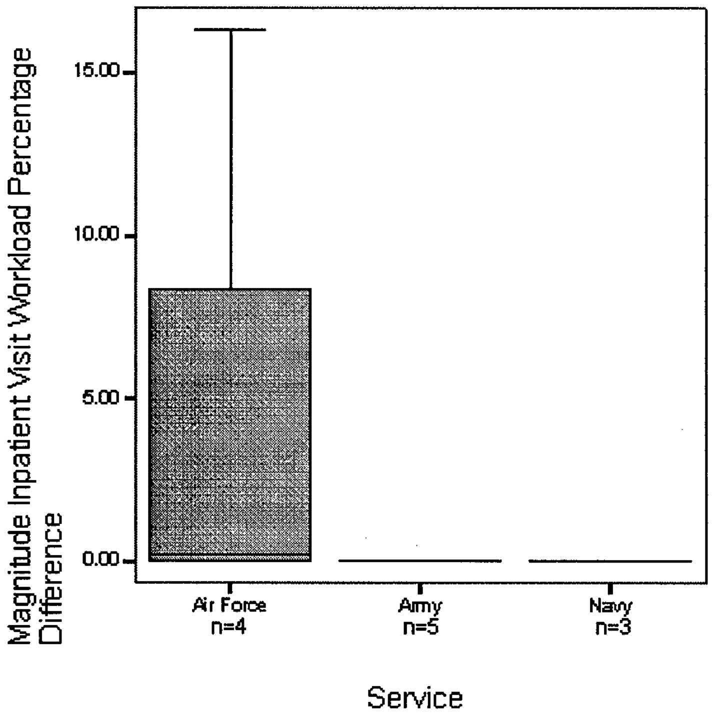
<u>Boxplot distribution of FY96 Disposition workload differences at the functional category level</u>




* - Represents extreme data points
o - Represents outlier data points

Figure 16

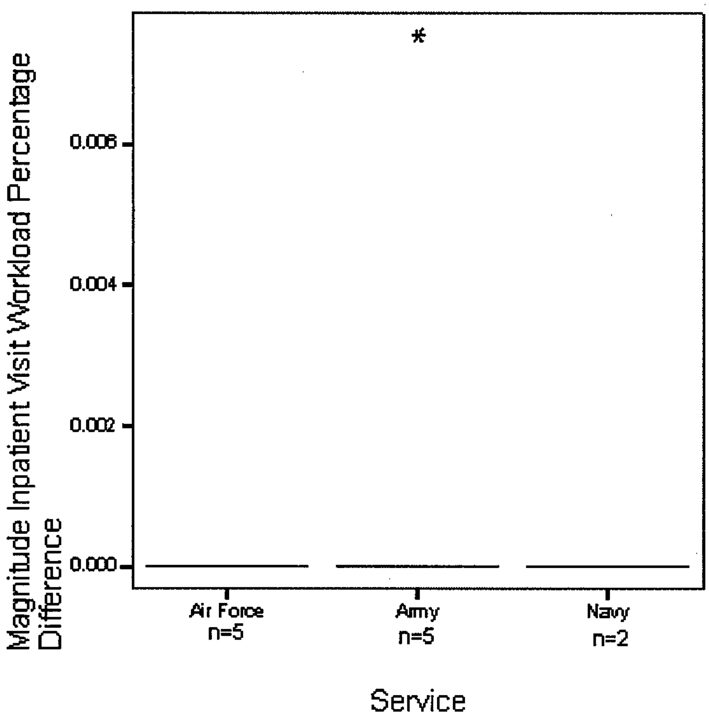
Boxplot distribution of FY 95 Inpatient Visit workload differences at the functional category level




* - Represents extreme data points
o - Represents outlier data points

Figure 17

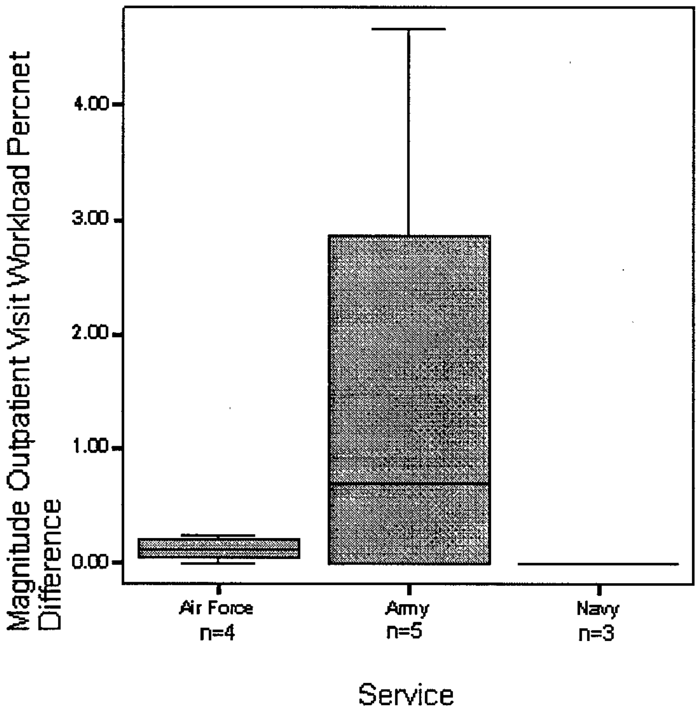
Boxplot distribution of FY 96 Inpatient Visit workload differences at the functional category level




* - Represents extreme data points
o - Represents outlier data points

Figure 18

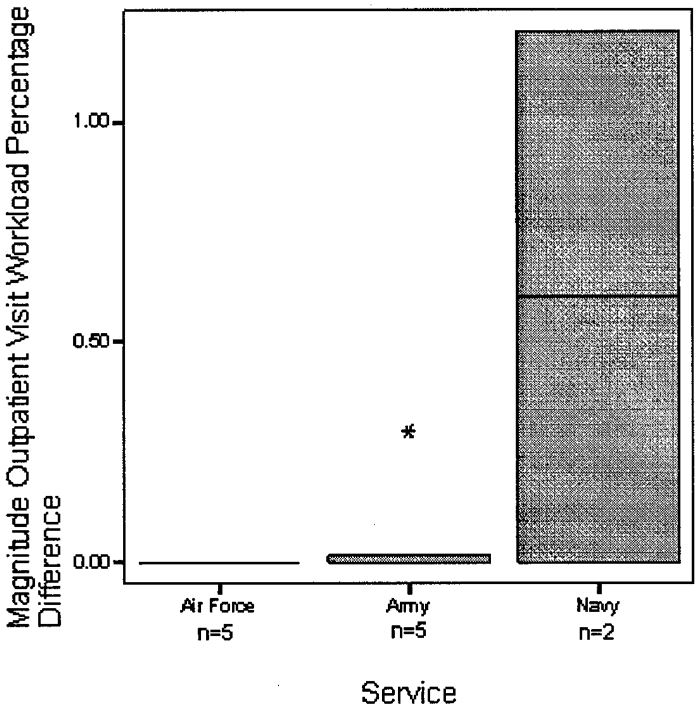
Boxplot distribution of FY95 Outpatient Visit workload differences at the functional category level




* - Represents extreme data points
o - Represents outlier data points

Figure 19

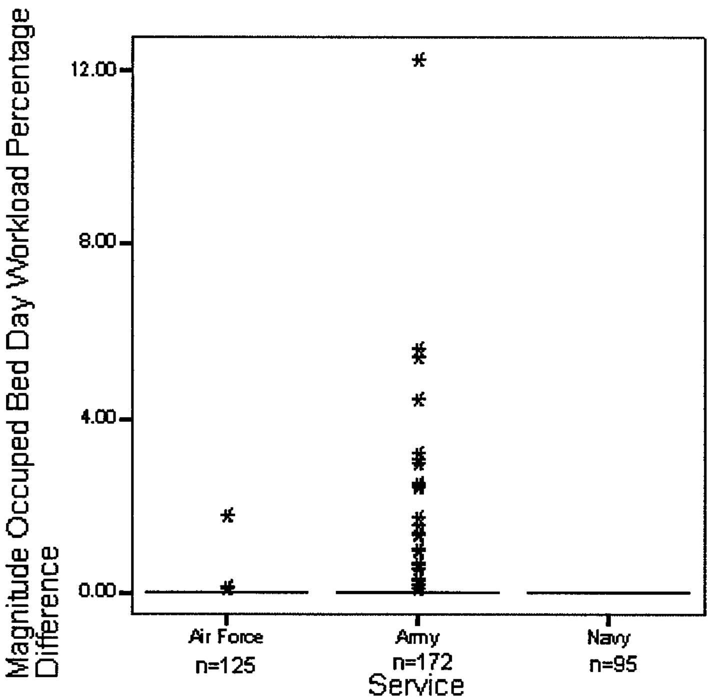
Boxplot distribution of FY96 Outpatient Visit workload differences at the functional category level




* - Represents extreme data points
o - Represents outlier data points

Figure 20

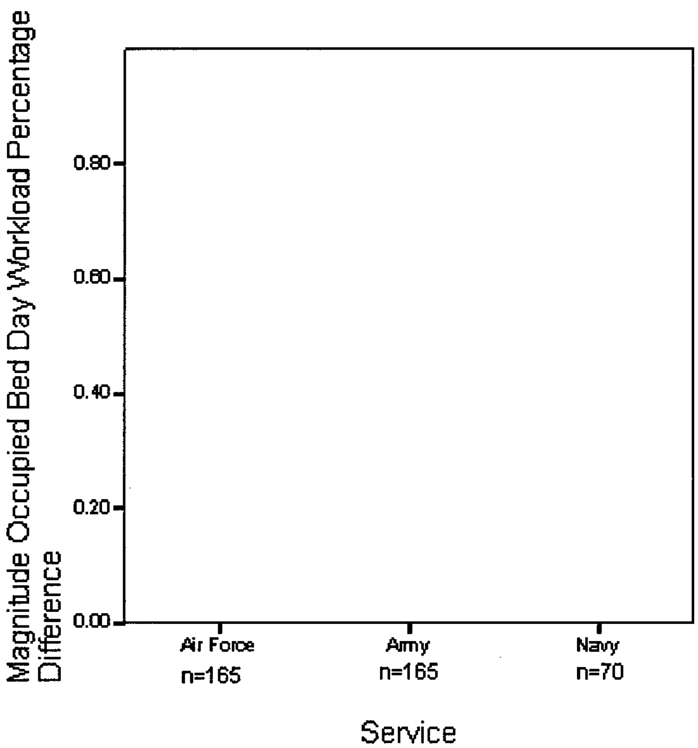
<u>Boxplot distribution of FY95 Occupied Bed Day workload differences at the work center level</u>




* - Represents extreme data points
o - Represents outlier data points

Figure 21

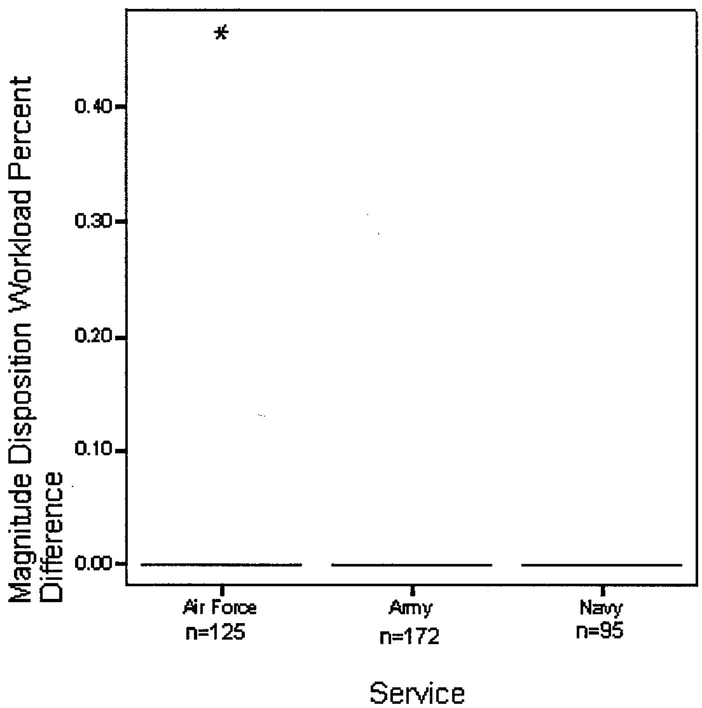
<u>Boxplot distribution of FY96 Occupied Bed Day workload differences at the work center level</u>




* - Represents extreme data points
o - Represents outlier data points

Figure 22

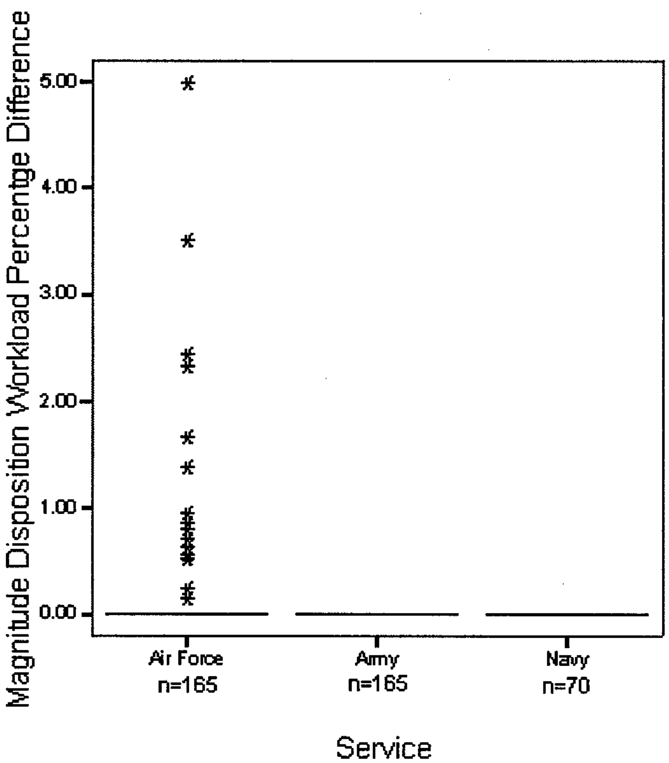
Boxplot distribution of FY95 Disposition workload differences at the work center level




* - Represents extreme data points
o - Represents outlier data points

Figure 23

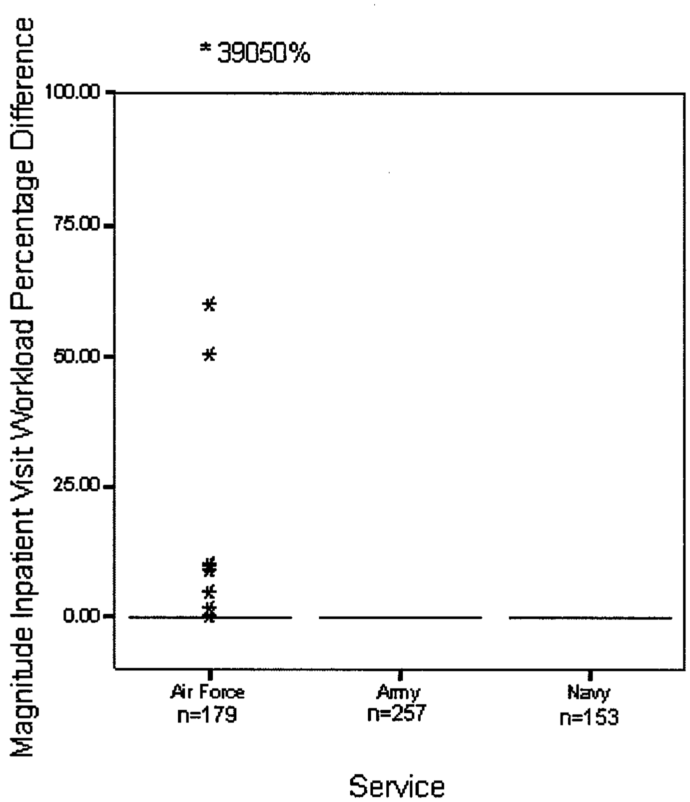
Boxplot distribution of FY96 Disposition workload differences at the work center level




* - Represents extreme data points
o - Represents outlier data points

Figure 24

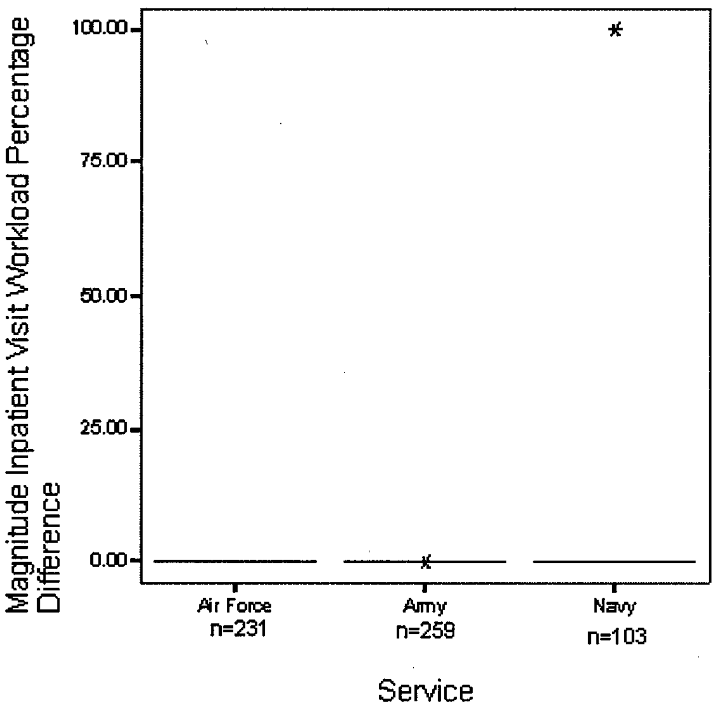
Boxplot distribution of FY 95 Inpatient Visit workload differences at the work center level




* - Represents extreme data points
o - Represents outlier data points

Figure 25

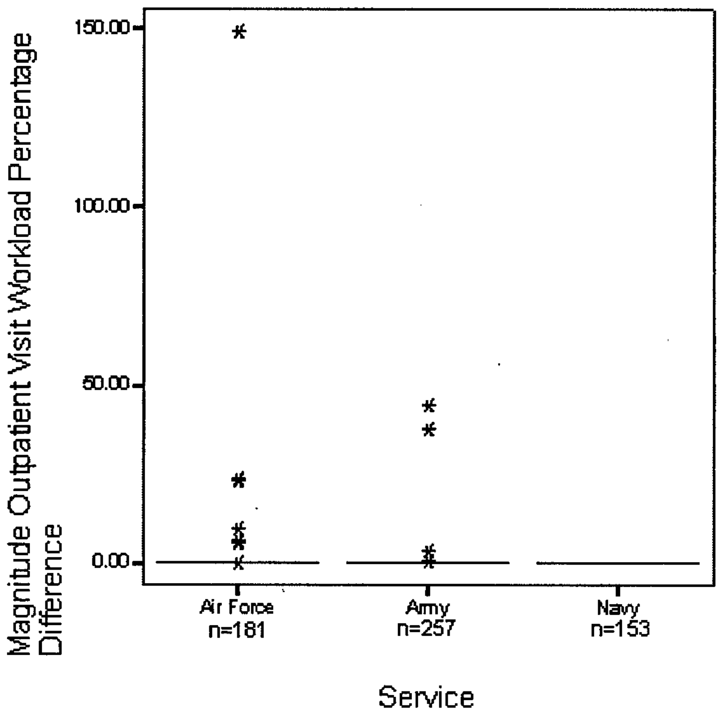
Boxplot distribution of FY 96 Inpatient Visit workload differences at the work center level




* - Represents extreme data points
o - Represents outlier data points

Figure 26

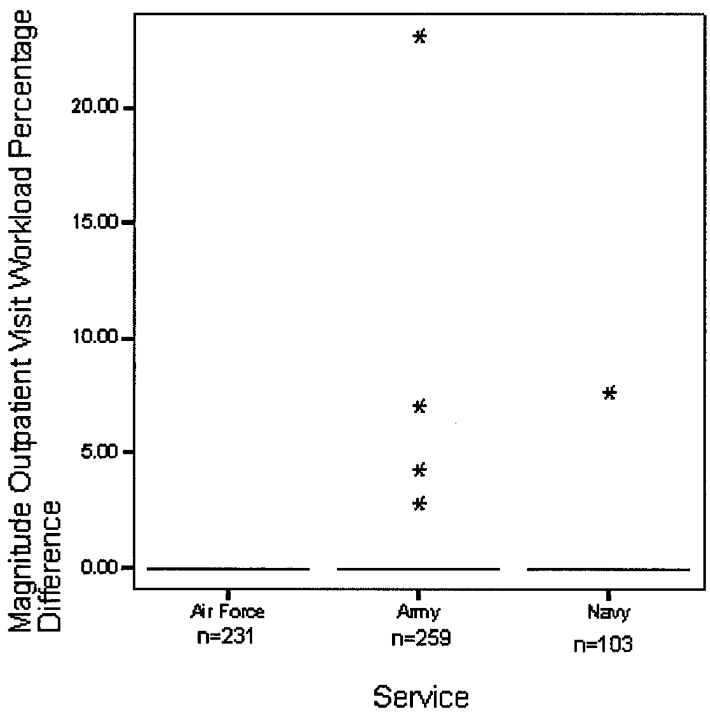
Boxplot distribution of FY95 Outpatient Visit workload differences at the work center level




* - Represents extreme data points
o - Represents outlier data points

Figure 27

<u>Boxplot distribution of FY96 Outpatient Visit workload differences at the work center level</u>




* - Represents extreme data points
o - Represents outlier data points

Figure 28:

MEPRS Data Processing and Reporting Process

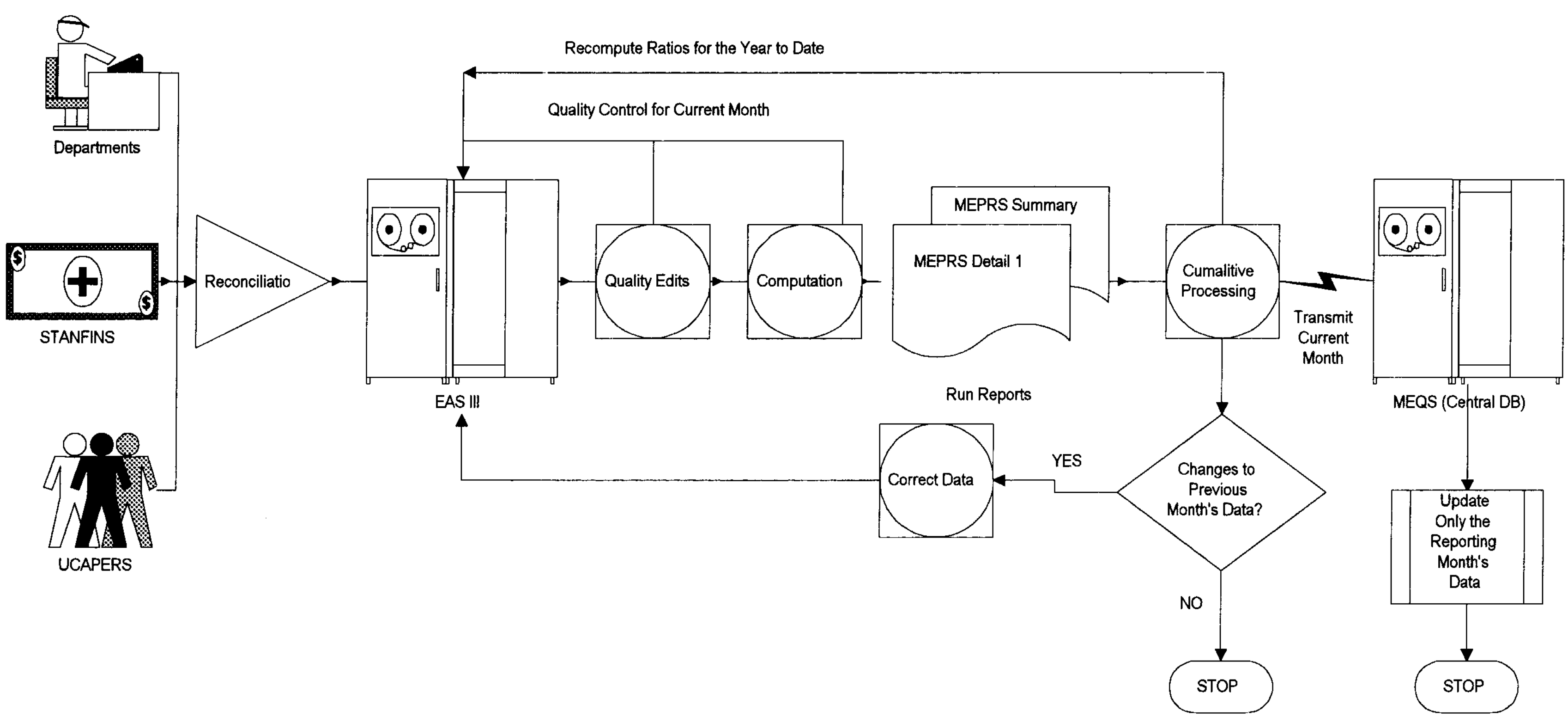


Table 1
Sample sizes for all analysis by service

| | | Fiscal Year 1995 | | | | Fiscal Year 1996 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sample Categroy | Air Force | Navy | Army | Total | Air Force | Navy | Army | Total |
| Expense | MTFs | 4 | 3 | 5 | 12 | 5 | 2 | 5 | 12 |
| Data | Functional Accounts[a] | 28 | 21 | 35 | 84 | 35 | 14 | 35 | 84 |
| | Work Centers[b] | | | | | | | | |
| | Ancillary[c] | 439 | 350 | 616 | 1405 | 572 | 242 | 620 | 1434 |
| | Step Down[d] | 229 | 177 | 293 | 699 | 293 | 125 | 278 | 696 |
| Workload | MTFs[e] | -- | -- | -- | -- | -- | -- | -- | -- |
| Data | Functional Accounts[a] | 8 | 6 | 10 | 24 | 10 | 4 | 10 | 24 |
| | Work Centers[b] | | | | | | | | |
| | Inpatient Services[f] | 125 | 95 | 172 | 392 | 165 | 70 | 165 | 400 |
| | Ambulatory Services[g] | 181 | 153 | 257 | 591 | 231 | 103 | 259 | 593 |

Note: All values are prior to normalization and removal of outliers

[a] 1st Level MEPRS ( A through G accounts )

[b] 3rd Level MEPRS

[c] 'Dxx' and 'Exx' work centers

[d] 'Axx', 'Bxx', 'Cxx', 'Fxx', and 'Gxx' work centers

[e] Workload data was not analyzed at the MTF Level

Table 2
Average number of work centers per category

| Functional Account | | Average Number of Workceters |
|---|---|---|
| A | Inpatient | 33 |
| B | Ambulatory | 49 |
| C | Dental | 2 |
| D | Ancillary | 24 |
| E | Support | 34 |
| F | Special Programs | 27 |
| G | Medical Readiness | 7 |
| | EACH MTF | 177 |

Note: The averages listed include both fiscal years 1995 and 1996

Table 3
MTF level gross expense information comparison

| | | Fiscal Year 1995 | | Fiscal Year 1996 | |
|---|---|---|---|---|---|
| Service | Measurement | Expense Difference[a] | Percent Difference[b] | Expense Difference[a] | Percent Difference[b] |
| Air Force | median | $ 1,342,261.15 | 1.20% | $ 223.88 | < .01% |
| | N | 4 | 4 | 5 | 5 |
| Navy | median | $ 497,528.84 | 0.18% | $ 400,810.72 | 0.12% |
| | N | 3 | 3 | 3 | 3 |
| Army | median | $ 1,121.15 | < .01% | $ 449.97 | < .01% |
| | N | 5 | 5 | 5 | 5 |
| Total | median | $ 133,836.18 | 0.04% | $ 427.23 | < .01% |
| | N | 12 | 12 | 12 | 12 |

Note: All measurements are median magnitude measurements
a Expense Difference = Absolute Value (central MEPRS expense value - local MEPRS expense value)
b Magnitude Difference = Absolute Value ( ( Expense Difference / central MEPRS value ) * 100 )

Table 4

Kruskal-Wallis test of the three services' expense differences at the MTF summary level

| Fiscal Year | | Magnitude Expense Percent Difference |
|---|---|---|
| 1995 | Chi-Square | 4.154 |
| | df | 2 |
| | P-Value | 0.125 |
| 1996 | Chi-Square | 1.154 |
| | df | 2 |
| | P-Value | 0.562 |

Table 5
Functional category expense information comparison.

| | | Fiscal Year 1995 | | Fiscal Year 1996 | |
|---|---|---|---|---|---|
| Service | Measurem | Expense Difference[a] | Percent Difference[b] | Expense Difference[a] | Percent Difference[b] |
| Air Force | median | $ 333,625.88 | 0.92% | $ 95,644.74 | 0.24% |
| | N | 28 | 28 | 35 | 35 |
| Navy | median | $ 153,128.07 | 0.25% | $ 296,553.25 | 0.30% |
| | N | 19 | 21 | 14 | 14 |
| Army | median | $ 77,743.14 | 0.18% | $ 150,761.96 | 0.30% |
| | N | 34 | 35 | 35 | 35 |
| Total | median | $ 120,675.39 | 0.41% | $ 136,068.31 | 0.29% |
| | N | 84 | 84 | 84 | 84 |

Note: All values are magnitude expressions
a Expense Difference = ABS (central MEPRS expense value - local MEPRS expense value)
b Percent Difference = ABS ( ( Expense Difference / central MEPRS value ) X 100 )

Table 6

Kruskal-Wallis test of the three services' expense differences at the Functional Category level

| Fiscal Year | | Magnitude Expense Percent Difference |
|---|---|---|
| 1995 | Chi-Square | 11.352 |
| | df | 2 |
| | P-Value | 0.003* |
| 1996 | Chi-Square | 0.163 |
| | df | 2 |
| | P-Value | 0.992 |

* Significant p < .05

Table 7

Mann-Whitney, post-hoc, pair-wise comparison of expense differences at the Functional categroy level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=28) | Navy (n=21)* | 164 | -2.626 | 0.009 |
| | Air Force (n=28) | Army (n=35)* | 265 | -3.112 | 0.002 |
| | Navy (n=21) | Army (n=35) | 358 | -0.161 | 0.872 |
| 1996 | Not Applicable, Test not warranted | | | | |

* significant at p < .0170

Table 8

Inpatient service functional category workload comparisons

| Service | | Fiscal Year 1995 | | | | Fiscal Year 1996 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Occupied Bed Day (OBD) Difference[a] | OBD Percent Difference[b] | Dispostion Difference[c] | Dispostion Percent Difference[d] | Occupied Bed Day (OBD) Difference[a] | OBD Percent Difference[b] | Dispostion Difference[c] | Dispostion Percent Difference[d] |
| Air Force | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| Navy | median | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | < 0.01% |
| | N | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| Army | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Total | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |

Note: All values are magnitude measurements

[a] OBD Difference = central MEPRS OBD Value - local MEPRS OBD Value

[b] OBD Magnitude Difference = Absolute Value ( ( OBD Difference / central MEPRS OBD value ) X 100 )

[c] Disposition Difference = central MEPRS disposition value - local MEPRS disposition value

[d] Disposition Magnitude Difference = Absolute Value ( ( Disposition Difference / central MEPRS dispostion value ) X 100 )

Table 9

Ambulatory service functional category workload comparisons

| | | Fiscal Year 1995 | | | | Fiscal Year 1996 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Service | | Inpatient Visit (IPV) Difference[a] | IPV Percent Difference[b] | Outpatient Visit (OPV) Difference[c] | OPV Percent Difference[d] | Inpatient Visit (IPV) Difference[a] | IPV Percent Difference[b] | Outpatient Visit (OPV) Difference[c] | OPV Percent Difference[d] |
| Air Force | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% |
| | N | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| Navy | median | 0 | 0.00% | 0 | 0.00% | 0 | < 0.01% | 10388 | 0.60% |
| | N | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| Army | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Total | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% |
| | N | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |

Note: All values are magnitude measurements

[a] IPV Difference = central MEPRS IPV value - local MEPRS IPV value

[b] IPV Magniude Difference = Absolute Value ( ( IPV Difference / central MEPRS IPV Value ) X 100 )

[c] OPV Difference = central MEPRS OPV Value - local MEPRS OPV value

[d] OPV Magnitude Difference = Absolute Value ( ( OPV Difference / central MEPRS OPV value ) X 100 )

Table 10
Summary of all Inpatient functional category comparisons with matching workload data

| Fiscal Year | Occupied Bed Day (OBD) Account Matches | Percentage OBD Matches | Disposition Account Matches | Percentage Disposition Matches |
|---|---|---|---|---|
| 1995 (n = 12) | 10 | 83.3% | 11 | 91.7% |
| 1996 (n = 12) | 12 | 100.0% | 11 | 91.7% |

Note: numbers and percentages represent all the inpatient functional accounts with the same OBD or Disposition workload values in both the local and central MEPRS databases.

Table 11

Summary of all Ambulatory functional category comparisons with matching workload data

| Fiscal Year | Inpatient Visit (IPV) Account Matches | Percent IPV Matches | Outpatient Visit (OPV) Account Matches | Percent OPV Matches |
|---|---|---|---|---|
| 1995 (n = 12) | 10 | 83.3% | 6 | 50.0% |
| 1996 (n = 12) | 11 | 91.7% | 9 | 75.0% |

Note: numbers and percentages represent all the Ambulatory functional accounts with the same IPV or OPV workload values in both the local and central MEPRS databases.

Table 12

Kruskal-Wallis test of the three service's workload differences at the Functional category

| Fiscal Year | | Occupied Bed Day Percent Difference | Disposition Percent Difference | Inpatient Visit Percent Difference | Outpatient Visit Percent Difference |
|---|---|---|---|---|---|
| 1995 | Chi-Square | 0.73 | 2.000 | 4.364 | 3.402 |
| | df | 2 | 2 | 2 | 2 |
| | P-Value | 0.69400 | 0.368 | 0.113 | 0.183 |
| 1996 | Chi-Square | 0.000 | 1.400 | 1.400 | 2.876 |
| | df | 2 | 2 | 2 | 2 |
| | P-Value | 1.00000 | 0.497 | 0.497 | 0.237 |

Note: Analysis is based upon median magnitude measurements

Table 13
Ancillary and Support work center expense comparisons.

| | | Fiscal Year 1995 | | Fiscal Year 1996 | |
|---|---|---|---|---|---|
| Service | Measurement | Expense Difference[a] | Percent Difference[b] | Expense Difference[a] | Percent Difference[b] |
| Air Force | median | $ 5,035.07 | 0.67% | $ 2,023.93 | 0.17% |
| | N | 229 | 229 | 293 | 293 |
| Navy | median | $ 2,355.10 | 0.25% | $ 2,145.06 | 0.20% |
| | N | 177 | 177 | 125 | 125 |
| Army | median | $ 1,093.48 | 0.09% | $ 3,952.78 | 0.24% |
| | N | 293 | 293 | 276 | 276 |
| Total | median | $ 2,362.05 | 0.24% | $ 2,659.52 | 0.21% |
| | N | 699 | 699 | 694 | 694 |

Note: All values are magnitude expressions

a Expense Difference = ABS (central MEPRS expense value - local MEPRS expense value)

b Percent Difference = ABS ( ( Expense Difference / central MEPRS value ) X 100 )

Table 14

Kruskal-Wallis test of the three services' expense differences at the Ancillary Support work center level.

| Fiscal Year | | Magnitude Expense Percent Difference |
|---|---|---|
| 1995 | Chi-Square | 54.366 |
| | df | 2 |
| | P-Value | 0.000* |
| 1996 | Chi-Square | 1.59 |
| | df | 2 |
| | P-Value | 0.452 |

* Significant at $p < .05$

Table 15

Mann-Whitney post-hoc, pair-wise comparison of expense differences at the Ancillary and Support workcenter level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=229) | Navy (n=177)* | 15168 | -4.35 | < 0.001 |
| | Air Force (n=229) | Army (n=293)* | 21407 | -7.133 | < 0.001 |
| | Navy (n=177) | Army (n=293)* | 21805 | -2.901 | 0.004 |
| 1996 | Not Applicable, Test not warranted | | | | |

* Significant a P < .0170

Table 16

Step-down work centers expense comparisons

| | | Fiscal Year 1995 | | Fiscal Year 1996 | |
|---|---|---|---|---|---|
| Service | Measurement | Expense Difference[a] | Percent Difference[b] | Expense Difference[a] | Percent Difference[b] |
| Air Force | median | $ 12,653.53 | 1.86% | $ 6,892.25 | 1.30% |
| | N | 438 | 438 | 568 | 568 |
| Navy | median | $ 7,487.57 | 0.78% | $ 8,720.92 | 0.84% |
| | N | 347 | 347 | 240 | 240 |
| Army | median | $ 4,103.35 | 0.75% | $ 7,749.04 | 1.01% |
| | N | 616 | 616 | 617 | 617 |
| Total | median | $ 6,738.45 | 1.01% | $ 7,631.92 | 1.04% |
| | N | 1401 | 1401 | 1425 | 1425 |

Note: All values are magnitude expressions

a Expense Difference = ABS (central MEPRS expense value - local MEPRS expense value)

b Percent Difference = ABS ( ( Expense Difference / central MEPRS value ) X 100 )

Table 17

Kruskal-Wallis test of the three services' expense differences at the Step-Down work center level.

| Fiscal Year | | Magnitude Expense Percent Difference |
|---|---|---|
| 1995 | Chi-Square | 65.232 |
| | df | 2 |
| | P-Value | 0.000* |
| 1996 | Chi-Square | 15.159 |
| | df | 2 |
| | P-Value | 0.001* |

* Significant at P < .05

Table 18

Mann-Whitney, post-hoc, pair-wise comparison of expense differences at the Step-Down workcenter level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=438) | Navy (n=347)* | 59544 | -5.213 | < 0.001 |
| | Air Force (n=438) | Army (n=616)* | 95514 | -8.088 | < 0.001 |
| | Navy (n=347) | Army (n=616) | 102107.5 | -1.151 | 0.25 |
| 1996 | Air Force (n=568) | Navy (n=240)* | 56575.5 | -3.821 | < 0.001 |
| | Air Force (n=568) | Army (n=617) | 163018.5 | -2.075 | 0.038 |
| | Navy (n=240) | Army (n=617) | 66424.5 | -2.34 | 0.019 |

* Signficant at P < 0.0170

Table 19

Inpatient service work center workload comparisons

| Service | | Fiscal Year 1995 | | | | Fiscal Year 1996 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Occupied Bed Day (OBD) Difference[a] | OBD Percent Difference[b] | Dispostion Difference[c] | Dispostion Percent Difference[d] | Occupied Bed Day (OBD) Difference[a] | OBD Percent Difference[b] | Dispostion Difference[c] | Dispostion Percent Difference[d] |
| Air Force | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 125 | 125 | 125 | 125 | 165 | 165 | 165 | 165 |
| Navy | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 95 | 95 | 95 | 95 | 70 | 70 | 70 | 70 |
| Army | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 172 | 172 | 172 | 172 | 165 | 165 | 165 | 165 |
| Total | median | 0 | < 0.01% | 0 | < 0.01% | 0 | 0.00% | 0 | < 0.01% |
| | N | 392 | 392 | 392 | 392 | 400 | 400 | 400 | 400 |

Note: All values are magnitude measurements

[a] OBD Difference = ABS (central MEPRS OBD Value - local MEPRS OBD Value)

[b] OBD Magnitude Difference = ABS ( ( OBD Difference / central MEPRS OBD value ) X 100 )

[c] Disposition Difference = ABS ( central MEPRS disposition value - local MEPRS disposition value )

[d] Disposition Magnitude Difference = ABS ( ( Disposition Difference / central MEPRS dispostion value ) X 100 )

Table 20
Ambulatory service work center workload comparison.

| | | Fiscal Year 1995 | | | | Fiscal Year 1996 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Service | | Inpatient Visit (IPV) Difference[a] | IPV Percent Difference[b] | Outpatient Visit (OPV) Difference[c] | OPV Percent Difference[d] | Inpatient Visit (IPV) Difference[a] | IPV Percent Difference[b] | Outpatient Visit (OPV) Difference[c] | OPV Percent Difference[d] |
| Air Force | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% |
| | N | 181 | 179[e] | 181 | 181 | 231 | 231 | 231 | 231 |
| Navy | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 10388 | < 0.01% |
| | N | 153 | 153 | 153 | 153 | 103 | 103 | 103 | 103 |
| Army | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% |
| | N | 257 | 257 | 257 | 257 | 259 | 259 | 259 | 259 |
| Total | median | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% | 0 | < 0.01% |
| | N | 591 | 589[e] | 591 | 591 | 593 | 593 | 593 | 593 |

Note: All values are magnitude measurements

[a] IPV Difference = ABS ( central MEPRS IPV value - local MEPRS IPV value )

[b] IPV Magniude Difference = ABS ( ( IPV Difference / central MEPRS IPV Value ) X 100 )

[c] OPV Difference = ABS ( central MEPRS OPV Value - local MEPRS OPV value )

[d] OPV Magnitude Difference = ABS ( ( OPV Difference / central MEPRS OPV value ) X 100 )

[e] The analysis had two missing values because the central MEPRS OPV value was zero.

Table 21
Kruskal-Wallis test of the three services' workload differences at the work center level

| Fiscal Year | | Occupied Bed Day Percent Difference | Disposition Percent Difference | Inpatient Visit Percent Difference | Outpatient Visit Percent Difference |
|---|---|---|---|---|---|
| 1995 | Chi-Square | 23.239 | 2.136 | 30.392 | 7.008 |
| | df | 2 | 2 | 2 | 2 |
| | P-Value | 0.000* | 0.344 | 0.000* | 0.030* |
| 1996 | Chi-Square | 0.000 | 28.317 | 2.033 | 3.497 |
| | df | 2 | 2 | 2 | 2 |
| | P-Value | 1.000 | 0.000* | 0.362 | 0.174 |

Note: Analysis is based upon median magnitude measurements
* - Significant < .05

Table 22 A
Mann-Whitney, post-hoc, pair-wise comparison of FY95 occupied bed day differences at the work center level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=125) | Navy (n=95) | 5795 | -1.517 | 0.129 |
| | Air Force (n=125) | Army (n=172)* | 9551 | -3.347 | 0.001 |
| | Navy (n=95) | Army (n=172)* | 7077.5 | -3.716 | < 0.001 |
| 1996 | Not Applicable, Test not warranted | | | | |

Table 22 B
Mann-Whitney, post-hoc, pair-wise comparison of FY95 inpatient visit differences at the work center level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=179) | Navy (n=153)* | 12699 | -3.395 | 0.001 |
| | Air Force (n=179) | Army (n=257)* | 21331 | -4.38 | < 0.001 |
| | Navy (n=153) | Army (n=257) | 19660 | 0.000 | 1.000 |
| 1996 | Not Applicable, Test not warranted | | | | |

Table 22 C
Mann-Whitney, post-hoc, pair-wise comparison of FY95 outpatient visit differences at the work center level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=181) | Navy (n=153)* | 13311 | -2.455 | 0.014 |
| | Air Force (n=181) | Army (n=257) | 22727 | -1.52 | 0.128 |
| | Navy (n=153) | Army (n=257) | 19354 | -1.549 | 0.121 |
| 1996 | Not Applicable, Test not warranted | | | | |

Note: Pair-wise comparisons based upon median magnitude workload percentage differences
* Significant < .0170

Table 23
Mann-Whitney, post-hoc, pair-wise comparison of FY96 disposition workload differences at the work center level

| Fiscal Year | Independent Sample 1 | Independent Sample 2 | Mann-Whitney U | Z | P-Value |
|---|---|---|---|---|---|
| 1995 | Air Force (n=165) | Navy (n=70)* | 5110 | -2.952 | 0.003 |
| | Air Force (n=165) | Army (n=165)* | 12045 | -4.481 | < 0.001 |
| | Navy (n=70) | Army (n=165) | 5775 | 0.000 | 1.000 |
| 1996 | Not Applicable, Test not warranted | | | | |

Note: Pair-wise comparisons based upon median magnitude workload percentage differences
* Significant < .0170

Table 24

Summary of all Inpatient service work centers with matching workload data

| Fiscal Year | Occupied Bed Day (OBD) Account Matches | Percentage OBD Matches | Disposition Account Matches | Percentage Disposition Matches |
|---|---|---|---|---|
| 1995 (n = 392) | 366 | 93.4% | 391 | 99.7% |
| 1996 (n = 400) | 400 | 100.0% | 381 | 95.3% |

Note: numbers and percentages represent all the inpatient service work centers with the same OBD or Disposition workload values in both the local and central MEPRS databases.

Table 25

Summary of all Ambulatory service work centers with matching workload data.

| Fiscal Year | Inpatient Visit (IPV) Account Matches | Percent IPV Matches | Outpatient Visit (OPV) Account Matches | Percent OPV Matches |
|---|---|---|---|---|
| 1995 (n = 591) | 576 | 97.5% | 580 | 98.1% |
| 1996 (n = 593) | 591 | 99.7% | 588 | 99.2% |

Note: numbers and percentages represent all the Ambulatory service workcenters with the same IPV or OPV workload values in both the local and central MEPRS databases.

# APPENDIX A

Active GME MEDCENS by Defense Medical Information System Identification (DMISID) Facility Code

| DMISID | Facility Name | Location |
|---|---|---|
| 0014 | $60^{th}$ Medical Group (David Grant) | Travis Air Force Base, CA |
| 0029 | San Diego Naval Medical Center | San Diego, CA |
| 0037 | Walter Reed Army Medical Center | Washington, DC |
| 0047 | Eisenhower Army Medical Center | Fort Gordon, GA |
| 0052 | Tripler Army Medical Center | HI |
| 0066 | $89^{th}$ Medical Group (Malcom Grow) | Andrews Air Force Base, MD |
| 0067 | Bethesda Naval Medical Center | Bethesda, MD |
| 0073 | 81st Medical Group | Keesler Air Force Base, MS |
| 0095 | $74^{th}$ Medical Group | Wright-Patterson Air Force Base, OH |
| 0108 | William Beaumont Army Medical Center | Fort Bliss, TX |
| 0109 | Brooke Army Medical Center | San Antonio, TX |
| 0117 | $59^{th}$ Medical Wing (Wilford Hall) | Langford Air Force Base, TX |
| 0124 | Portsmouth Naval Medical Center | Portsmouth, VA |
| 0125 | Madigan Army Medical Center | Fort Lewis, WA |

# APPENDIX B

MEPRS 1-Digit Category
Functional Categories

| Code | Functional Category |
|---|---|
| A | Inpatient Care |
| B | Ambulatory Care |
| C | Dental Care |
| D | Ancillary Care |
| E | Support Services |
| F | Special Programs |
| G | Medical Readiness |

# APPENDIX C
MEPRS 2 Digit Categories
Summary Accounts

| Code | Summary Account |
|---|---|
| AA | Medical Care |
| AB | Surgical Care |
| AC | Obstetrical and Gynecological Care |
| AD | Pediatric Care |
| AE | Orthopedic Care |
| AF | Psychiatric Care |
| AG | Family Practice |
| BA | Medical Care |
| BB | Surgical Care |
| BC | Obstetrical and Gynecological Care |
| BD | Pediatric Care |
| BE | Orthopedic Care |
| BF | Psychiatric/Mental Health Care |
| BG | Family Practice Care |
| BH | Primary Medical Care |
| BI | Emergency Medical Care |
| BJ | Flight Medicine Care |
| BK | Underseas Medicine Care |
| BL | Rehabilitative Ambulatory Services |
| CA | Dental Services |
| CB | Dental Laboratory Services |
| CC | Dental Prosthetic Laboratory |
| DA | Pharmacy |
| DB | Pathology |
| DC | Radiology |
| DD | Special Procedures Services |
| DE | Central Sterile Supply/Material Services |
| DF | Surgical Services |
| DG | Same Day Services |
| DH | Rehabilitative Services |
| DI | Nuclear Medicine |
| DJ | Intensive Care |
| EA | Depreciation |
| EB | Command, Management, Administration |
| EC | Support Services-Nonreimbursable (NR) |
| ED | Support Services-Funded/Reimbursable |
| EE | Material Services |
| EF | Housekeeping |
| EG | Biomedical Equipment Repair Services |

| Code | Summary Account |
|---|---|
| EH | Laundry Service |
| EI | Dietetics |
| EJ | Inpatient Affairs |
| EK | Ambulatory Care Administration |
| FA | Specified Health Related Programs |
| FB | Public Health Services |
| FC | Health Care Services Contract |
| FD | Military Unique Medical Activities |
| FE | Patient Movement & Military Patient Administration |
| FF | Veterinary Services Army Only |
| GA | Readiness Planning & Administration |
| GB | Readiness Exercises |
| GC | Readiness Training |
| GD | Unit or Personnel Deployments |
| GE | Readiness Logistics Management |
| GF | Readiness Physical Training |
| GG | National Disaster Medical System (NDMS) |

**APPENDIX D**
MEPRS 3-Digit Category
Work Centers

| Code | Work Center |
|---|---|
| AAA | Internal Medicine |
| AAB | Cardiology |
| AAD | Dermatology |
| AAE | Endocrinology |
| AAF | Gastroenterology |
| AAG | Hematology |
| AAI | Nephrology |
| AAJ | Neurology |
| AAK | Oncology |
| AAL | Pulmonary/Upper Resp |
| AAM | Rheumatology |
| AAN | Physical Medicine |
| AAO | Clinical Immunology |
| AAP | HIV III (AIDS) |
| AAQ | Bone Marrow Transplant |
| AAR | Infectious Disease |
| AAS | Allergy |
| AAX | Medical Care Cost Pools |
| AAZ | MedCare Not Elsewhere Classified |
| ABA | General Surgery |
| ABB | Cardiovascular & Thoracic Surg |
| ABD | Neurosurger |
| ABE | Ophthalmology |
| ABF | Oral Surgery |
| ABG | Otorhinolaryngology |
| ABH | Pediatric Surgery |
| ABI | Plastic Surgery |
| ABJ | Proctology |
| ABK | Urology |
| ABL | Organ Transplant |
| ABM | Burn Unit |
| ABN | Peripheral Vascular |
| ABX | Surgical Care Cost Pools |
| ABZ | Surgical Care Not Elsewhere Classified |
| ACA | Gynecology |
| ACB | Obstetrics |
| ACX | Obstetrical and Gynecological Care Cost Pools |
| ACZ | Obstetrical/Gynecological Care Not Elsewhere Classified |
| ADA | Pediatrics |

| Code | Work Center |
|---|---|
| ADB | Newborn Nursery |
| ADD | Adolescent Pediatrics |
| ADX | Pediatric Care Cost Pools |
| ADZ | Pediatric Care Not Elsewhere Classified |
| AEA | Orthopedics |
| AEB | Podiatry |
| AEC | Hand Surgery |
| AEX | Orthopedic Care Cost Pools |
| AEZ | Orthopedic Care Not Elsewhere Classified |
| AFA | Psychiatry |
| AFB | Substance Abuse Rehabilitation |
| AFX | Psychiatry Care Cost Pools |
| AFZ | Psychiatry Care Not Elsewhere Classified |
| AGA | Family Practice Medicine |
| AGB | Family Practice Surgery |
| AGC | Family Practice Obstetrics |
| ABD | Family Practice Pediatrics |
| AGE | Family Practice Gynecology |
| AGF | Family Practice Psychiatry |
| AGG | Family Practice Orthopedics |
| AGH | Family Practice Nursery |
| AGX | Family Practice Cost Pools |
| BAA | Internal Medicine Clinic |
| BAB | Allergy Clinic |
| BAC | Cardiology Clinic |
| BAE | Diabetic Clinic |
| BAF | Endocrinology (Metabolism) Clinic |
| BAG | Gastroenterology Clinic |
| BAH | Hematology Clinic |
| BAI | Hypertension Clinic |
| BAJ | Nephrology Clinic |
| BAK | Neurology Clinic |
| BAL | Nutrition Clinic |
| BAM | Oncology Clinic |
| BAN | Pulmonary Disease Clinic |
| BAO | Rheumatology Clinic |
| BAP | Dermatology Clinic |
| BAQ | Infectious Disease Clinic |
| BAR | Physical Medicine |
| BAX | Medical Care Cost Pools |
| BAZ | Medical Care Not Elsewhere Classified |
| BBA | General Surgery Clinic |
| BBB | Cardiovascular & Thoracic Surgery Clinic |

| Code | Work Center |
|---|---|
| BBC | Neurosurgery Clinic |
| BBD | Ophthalmology Clinic |
| BBE | Organ Transplant Clinic |
| BBF | Otorhinolaryngology Clinic |
| BBG | Plastic Surgery Clinic |
| BBH | Proctology Clinic |
| BBI | Urology Clinic |
| BBJ | Pediatric Surgery Clinic |
| BBX | Surgical Care Cost Pools |
| BBZ | Surgical Care Not Elsewhere Classified |
| BCA | Family Planning Clinic |
| BCB | Gynecology Clinic |
| BCC | Obstetrics Clinic |
| BCX | Obstetrical and Gynecological Care Cost Pools |
| BCZ | Obstetrical/Gynecological Care Not Elsewhere Classified |
| BDA | Pediatric Clinic |
| BDB | Adolescent Clinic |
| BDC | Well Baby Clinic |
| BDX | Pediatric Care Cost Pools |
| BDZ | Pediatric Care Not Elsewhere Classified |
| BEA | Orthopedic Clinic |
| BEB | Cast Clinic |
| BEC | Hand Surgery Clinic |
| BEE | Orthotic Laboratory |
| BEF | Podiatry Clinic |
| BEX | Orthopedic Care Cost Pools |
| BEZ | Orthopedic Care Not Elsewhere Classified |
| BFA | Psychiatry Clinic |
| BFB | Psychology Clinic |
| BFC | Child Guidance Clinic |
| BFD | Mental Health Clinic |
| BFE | Social Work Clinic |
| BFF | Substance Abuse Rehab Clinic |
| BFX | Psychiatric/Mental Health Care Cost Pools |
| BFZ | Psychiatric Care Not Elsewhere Classified |
| BGA | Family Practice Clinic |
| BGX | Family Practice Care Cost Pools |
| BGZ | Family Practice Care Not Elsewhere Classified |
| BHA | Primary Care Clinics |
| BHB | Medical Examination Clinic |
| BHC | Optometry Clinic |
| BHD | Audiology Clinic |
| BHE | Speech Pathology |

| Code | Work Center |
|---|---|
| BHF | Community Health Clinic |
| BHG | Occupational Health Clinic |
| BHH | PRIMUS/NAVCARE Clinic |
| BHI | Immediate Care Clinic |
| BHX | Primary Medical Care Cost Pools |
| BHZ | Primary Medical Care Not Elsewhere Classified |
| BIA | Emergency Medical Clinic |
| BIX | Emergency Medical Care Cost Pools |
| BIZ | Emergency Medical Care Not Elsewhere Classified |
| BJA | Flight Medicine Clinic |
| BJX | Flight Medicine Care Cost Pools |
| BJZ | Flight Medicine Care Not Elsewhere Classified |
| BKA | Underseas Medicine Clinic |
| BKX | Underseas Medicine Care Cost Pools |
| BKZ | Underseas Medicine Care Not Elsewhere Classified |
| BLA | Physical Therapy Clinic |
| BLB | Occupational Therapy Clinic |
| BLC | Neuromusculoskeletal Screening |
| BLX | Rehabilitative Ambulatory Services Cost Pools |
| CAA | Dental Clinic |
| CAX | Dental Services Cost Pools |
| CAZ | Dental Services Care Not Elsewhere Classified |
| CBA | Dental Laboratory |
| CBX | Dental Laboratory Services Cost Pools |
| CBZ | Dental Laboratory Not Elsewhere Classified |
| CCA | Dental Laboratory |
| DAA | Pharmacy |
| DAX | Pharmacy Cost Pools |
| DAZ | Pharmacy Not Elsewhere Classified |
| DBA | Clinical Pathology |
| DBB | Anatomical Pathology |
| DBC | Blood Bank |
| DBX | Pathology Cost Pools |
| DBZ | pathology Not Elsewhere Classified |
| DCA | Diagnostic Radiology |
| DCB | Therapeutic Radiology |
| DCX | Radiology Cost Pools |
| DCZ | Radiology Not Elsewhere Classified |
| DDA | Electrocardiography |
| DDB | Electroencephalography |
| DDC | Electroneuromyography |
| DDD | Pulmonary Function |
| DDE | Cardiac Catherterization |

| Code | Work Center |
|---|---|
| DDX | Special Procedures Services Cost Pools |
| DDZ | Special Procedures Services Not Elsewhere Classified |
| DEA | Central Sterile Supply |
| DEB | Central Materiel Supply |
| DEX | Central Sterile Supply/Materiel Services Cost Pools |
| DEZ | Central Supply/Material Services Not Elsewhere Classified |
| DFA | Anesthesiology |
| DFB | Surgical Suite |
| DFC | Recovery Room |
| DFX | Surgical Services Cost Pools |
| DFZ | Surgical Services Not Elsewhere Classified |
| DGA | Same Day Surgery |
| DGB | Hemodialysis |
| DGC | Hyperbaric Medicine |
| DGD | Peritoneal Dialysis |
| DGX | Same Day Services Cost Pools |
| DGZ | Same Day Services Not Elsewhere Classified |
| DHA | Inhalation/Respiratory Therapy |
| DHX | Rehabilitation Services Cost Pools |
| DHZ | Rehabilitation Services Not Elsewhere Classified |
| DIA | Nuclear Medicine |
| DIX | Nuclear Medicine Cost Pools |
| DIZ | Nuclear Medicine Not Elsewhere Classified |
| DJA | Medical Intensive Care Unit |
| DJB | Surgical Intensive Care Unit |
| DJC | Coronary Care Unit |
| DJD | Neonatal Intensive Care Unit |
| DJE | Pediatric Intensive Care Unit |
| DJX | Intensive Care Cost Pools |
| EAA | Inpatient Depreciation |
| EAB | Ambulatory Depreciation |
| EAC | Dental Depreciation |
| EAD | Special Programs Depreciation |
| EAE | Medical Readiness Depreciation |
| EAX | Depreciation Cost Pools |
| EAZ | Depreciation Not Elsewhere Classified |
| EBA | Command |
| EBB | Special Staff |
| EBC | Administration |
| EBC | Clinical Management |
| EBE | Graduate Medical Education Support |
| EBF | Education & Training Program Support |
| EBG | Peacetime Exercises/Disaster Preparedness |

| Code | Work Center |
|---|---|
| EBH | Third Party Collection |
| EBX | Command, Management, Administration Cost Pools |
| EBZ | Command, Management, Administration Not Elsewhere Classified |
| ECA | Plant Management-NR |
| ECB | Operation of Utilities-NR |
| ECC | Maintenance of Real Property-NR |
| ECD | Minor Construction-NR |
| ECE | Other Engineering Support-NR |
| ECF | Lease of Real Property-NR |
| ECG | Transportation-NR |
| ECH | Fire Protection-NR |
| ECI | Police Protection-NR |
| ECJ | Communications-NR |
| ECK | Other Base Support Service-NR |
| ECX | Support Services-NR Cost Pools |
| ECZ | Support Services-NR Not Elsewhere Classified |
| EDA | Plant Management-Funded |
| EDB | Operation of Utilities-Funded |
| EDC | Maintenance of Real Property- Funded |
| EDD | Minor Construction- Funded |
| EDE | Other Engineering Support- Funded |
| EDF | Lease of Real Property- Funded |
| EDG | Transportation- Funded |
| EDH | Fire Protection- Funded |
| EDI | Police Protection- Funded |
| EDJ | Communications- Funded |
| EDK | Other MTF Support Services- Funded |
| EDX | Support Services-Funded/Reimbursable Cost Pools |
| EDZ | Support Services-F/R Not Elsewhere Classified |
| EEA | Material Services |
| EEX | Material Services Cost Pools |
| EEZ | Material Services Not Elsewhere Classified |
| EFA | Housekeeping-In house |
| EFB | Housekeeping-Contract |
| EFX | Housekeeping Cost Pools |
| EFZ | Housekeeping Not Elsewhere Classified |
| EGA | Biomedical Equipment Repair-In house |
| EGB | Biomedical Equipment Repair-Contract |
| EGX | Biomedical Equipment Repair-Cost Pools |
| EGZ | Biomedical Equipment Repair Services Not Elsewhere Classified |
| EHA | Laundry-In House |
| EHB | Laundry-Contract |
| EHX | Laundry Services Cost Pools |

| Code | Work Center |
|---|---|
| EHZ | Laundry Services Not Elsewhere Classified |
| EIA | Patient Food Operations |
| EIB | Combined Food Operations |
| EIC | Inpatient Clinical Dietetics |
| EIX | Dietetics Cost Pools |
| EIZ | Dietetics Not Elsewhere Classified |
| EJA | Inpatient Care Administration |
| EJX | Inpatient Affairs Cost Pools |
| EJZ | Inpatient Affairs Not Elsewhere Classified |
| EKA | Ambulatory Care Administration |
| EKX | Ambulatory Care Administration Cost Pools |
| EKZ | Ambulatory Care Administration Not Elsewhere Classified |
| FAA | Area Reference Laboratories |
| FAB | Area Reference Laboratories |
| FAC | Ophthalmic Fabrication and Repair |
| FAD | DoD Military Blood Program |
| FAF | Drug Screening and Testing Program |
| FAH | Clinical Investigation Program |
| FAI | Physiological Training/Support |
| FAK | Student Expenses |
| FAL | Continuing Health Education |
| FAX | Specified Health Related Programs Cost Pools |
| FAZ | Specified Health Related Programs Not Elsewhere Classified |
| FBB | Preventive Medicine |
| FBC | Industrial Hygiene Program |
| FBD | Radiation Health Program |
| FBE | Environmental Health Program |
| FBF | Epidemiology Program |
| FBI | Immunizations |
| FBX | Public Health Services Cost Pools |
| FBZ | Public Health Services Not Elsewhere Classified |
| FCA | Supplemental Care |
| FCB | Guest Lecturer and Consultant Program |
| FCC | CHAMPUS Beneficiary Support |
| FCD | Support to Other Military Activities |
| FCE | Support to Other Federal Agencies |
| FCF | Support to Non-Federal Activities |
| FCG | Support to NonMEPRS Reporting Medical Activities |
| FCX | Health Care Services Support Cost Pools |
| FCZ | Health Care Services Support Not Elsewhere Classified |
| FDB | Base Operations-Medical Installations |
| FDC | Nonpatient Food Operations |
| FDD | Decedent Affairs |

| Code | Work Center |
|---|---|
| FDE | Initial Outfitting |
| FDF | Urgent Minor Construction |
| FDG | TDY/TAD Enroute to PCS |
| FDH | Military Funded Emergency Leave |
| FDI | In-place Consecutive Overseas Tour Leave |
| FDX | Military Unique Medical Activities Cost Pools |
| FDZ | Military Unique Medical Activities Not Elsewhere Classified |
| FEA | Patient Transportation |
| FEB | Patient Movement Expenses |
| FEC | Transient Patient Care |
| FED | Military Patient Personnel Administration |
| FEE | Military Patients (Salaries) |
| FEF | Aeromedical Staging Facilities |
| FEX | Patient Movement & Military Patient Administration Cost Pools |
| FEZ | Patient Movement & Military Patient Administration Not Elsewhere Classified |
| FFA | Deputy Commander for Veterinary Services Army |
| FFB | Commissary Food Inspection Army Only |
| FFC | Troop Issue Supply Food Inspection |
| FFD | Supply Point Food Inspection Army |
| FFE | Depot Food Inspection Army Only |
| FFF | Origin Food Inspection Army Only |
| FFG | Veterinary laboratory Army Only |
| FFH | Animal Disease Prevention & Control Facility |
| FFX | Veterinary Services Army Only |
| FFZ | Veterinary Services Not Elsewhere Classified |
| GAA | Readiness Planning & Administration |
| GAB | Other Readiness Planning & Administration |
| GAX | Readiness Planning & Administration Cost Pools |
| GBA | Readiness Exercises |
| GBB | Other Readiness Exercises |
| GBX | Readiness Exercises Cost Pools |
| GCA | Readiness Training |
| GCB | Other Readiness Training |
| GCX | Readiness Training Cost Pools |
| GDA | Unit or Personnel Deployment |
| GDX | Unit or Personnel Deployment Cost Pools |
| GEA | Prepositioned War Reserve |
| GEB | Contingent Patient Care Areas |
| GEC | Contingent Patient Blocks/Packs |
| GEX | Readiness Logistics Management Cost Pools |
| GFA | Readiness Physical Training |
| GFX | Readiness Physical Training Cost Pools |
| GGA | NDMS Planning & Administration |

| Code | Work Center |
|---|---|
| GGB | NDMS Exercises |
| GGX | National Disaster Medical System Cost Pools |

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